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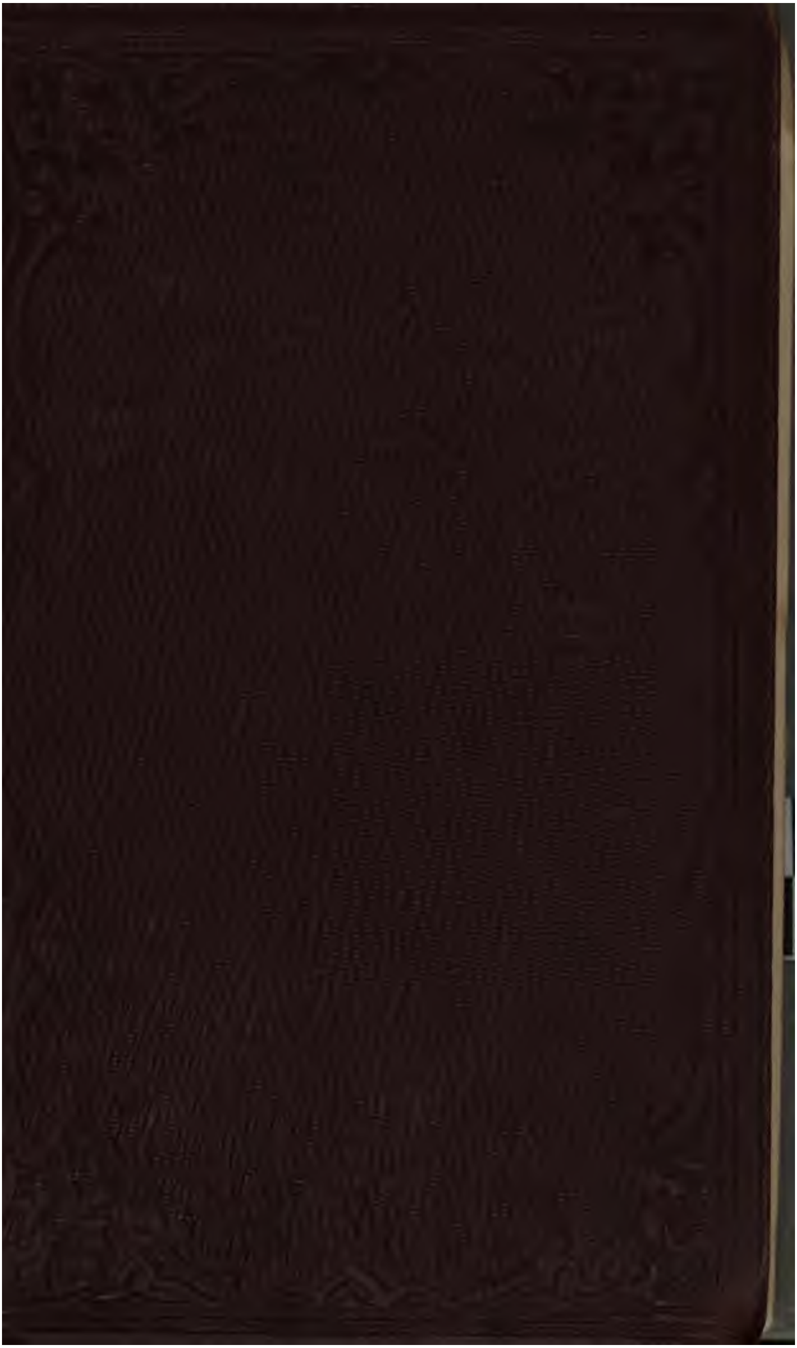

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"THE perceptions of the sense are gross, but even in the senses there is a difference. Though harmony and properties are not objects of sense, yet the eye and the ears are organs which offer to the mind such materials, by means whereof she may apprehend both the one and the other. By experiments of sense we become acquainted with the lower faculties of the soul; and from them, whether by a gradual evolution or ascent, we arrive at the highest. Sense supplies images to memory. These become subjects for fancy to work on; reason considers and judges of the imaginations, and these acts of reason become new objects to the understanding. In this scale, each lower faculty is a step that leads to the one above it, and the uppermost naturally leads to the Deity, which is rather the object of intellectual knowledge than even of the discursive faculty, not to mention the sensitive. There runs a chain throughout the whole system of beings. In this chain one link drags another; the meanest things are connected with the highest. The calamity, therefore, is neither strange nor much to be complained of, if a low sensual reader shall, from mere love of the animal life, find himself drawn in, surprised, and betrayed into, some curiosity concerning the intellectual."

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B. C. B.

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THE Session of Parliament was drawing to a close. Ministers took advantage of the approach of the grouse-shooting season to hurry through the two Houses the various Bills which they could not venture to postpone for another year. Some official and professional persons still lingered in the Clubs, but the houses in the squares were deserted, and there was an end for the season of what is called, *κατ' ἐξοχήν*, —London Society. Meeting accidentally a friend, whom I shall distinguish by the name of Crites, I expressed my surprise at seeing him still in London. "Our Court," said he, "has been sitting later than usual; but I am now emancipated, and I am about to pay a long-promised visit to our friend Eubulus. I know that it would afford him the greatest pleasure if you would accompany me as his visitor."

Eubulus had been my intimate friend in early life. As boys, we had wandered together through our native woods; as young men we had similar pursuits and tastes: had admired the same poetry, and had speculated together on subjects beyond the reach of human wit; but afterwards, being engaged in different professions, and our roads in life lying in different directions, we had parted company, and, as we travelled onwards, had only occasional glimpses of each other. Still, whenever we met, the influence of old associations remained unimpaired; we were as intimate as formerly, and seemed to know more of each other than of any of the friends whom we had acquired at a later period of life.

It was two or three years before the period of which I am now speaking that Eubulus, finding that his health was scarcely equal to the duties of the office which he held, and that, between what he had obtained by inheritance and a retiring pension, he had sufficient fortune to meet the reasonable demands of himself and his family, had gone to reside on a property, which he possessed, at the distance of a hundred miles from the Metropolis; and here he had repeatedly urged me to be his guest. Nothing could be more agreeable to me than the proposal which Crites made; and the result was that, in less than forty-eight hours, we were both seated in a carriage on the railway, and, in the course of a few hours more, were set down within a mile of our destination.

Our friend's house had been built in the 17th century, and, like many country houses of that date, was in a low situation, with a very limited prospect. But this defect was compensated by the beauty of the surrounding country, which exhibited all that variety of picturesque scenery which a varied geological structure usually affords. On one side were steep and lofty chalk hills, covered by a scanty herbage, and dotted with yews and junipers. On another side was a still loftier hill, but of a more gradual elevation, composed of sand with a thin soil over it, and covered with heath, with some clumps of Scotch firs scattered here and there. In the intermediate valley there were fields and meadows, with stubble and green pasture, and intersected by a stream of water; while at the foot of the chalk hills, and at no great distance from the house, there was an extensive beech wood, which, from the absence of underwood, and the magnitude and height of the trees, with their branches mingling above, might be compared to an enormous cathedral, with its columns, and arches, " and dim religious light."

On our arrival we found our friend waiting to receive us, there being no one with him but some of the junior members of his own family, who joined with him in his hospitalities. During the few days which our visit lasted we saw whatever was most worthy to be seen in the surrounding country, walking, or riding, and resting at intervals for the purpose of conversation. It seemed at times as if we had gone back to the period of our early life. We expressed ourselves as freely as when we were young, having before us the unknown country which we were about to explore. Still we were sensible that we were not what we had been formerly. The world was no longer that fairy-land which our imagination was wont to furnish with its own images. We knew it, and the people in it, and we knew ourselves, better than when we began our journey. We had lost the joys of hope and expectation, but we had also lost many of the anxieties which not unfrequently obscured our brighter visions, and years had not rolled over us without leaving us, in the realities of life, many worthy subjects of contemplation.

I have mentioned that Eubulus had quitted his official situation on account of the state of his health; but he had now so far recovered as to have considerable bodily activity, at the same time that he had lost none of his intellectual vigour. It was on the second day of our visit that I expressed to him the satisfaction which it afforded me to find that the experiment which he had made had proved to be so successful. I added, "It must, indeed, be delightful to you to find yourself here, where everything around you is so cheerful, with every comfort and luxury which you can wish for, and in the enjoyment of that perfect leisure which must be more agreeable from the contrast between it and the incessant exertions of your former life."

"I have reason," he answered, "to be grateful to God for the many blessings which I enjoy. But do not speak of perfect leisure as one of them. It was very soon after I was established here that I made the discovery that it was necessary to my happiness that I should provide some new occupation for myself; and I succeeded in doing so. To those who have been brought up in idleness, a life of leisure is bad enough; and hence we find that the more energetic among them are glad to exchange it for some kind of active pursuit — politics, travelling, field-sports, horse-racing, gambling, accordingly as their natural tastes and accidental circumstances give one or another direction to their minds. The vulgar phrase of killing time very aptly expresses the feelings of many on this subject. But if a life of leisure be painful to such persons, what must it be to one like you or me, who have advanced beyond the middle period of life, without having had any experience of it? This is no speculative inquiry; it may be answered from actual observation. Not a few persons who abandon their employments under the impression that they will be happy in doing so, actually die of *ennui*. It induces bodily disease more than physical or mental labour. Others, indeed, survive the ordeal. But where the body does not suffer, the mind often does. I have known instances of persons whose habits have been suddenly changed from those of great activity to those of no employment at all, who have been for a time in a state of mental excitement, or hypochondriasis, bordering on mental aberration. Moreover, it is with the mind as it is with the body — it is spoiled from want of use; and the clever and intelligent young man, who sits down to lead what is called a life of leisure, invariably becomes a stupid old man."

CRITES. You, at any rate, can have had no difficulty in finding an occupation for yourself. At school and college you made yourself not only a good Latin and Greek scholar, but also well acquainted with general literature. You have, I conclude, fallen back on your early studies; and your library, I perceive, affords you abundant opportunities of doing so.

EUBULUS. It is true that this is a great resource, and that a person who has been originally well educated, has a very great advantage over one who has been in this respect less fortunately situated. But do not take it for more than it is worth. It must be confessed that to one who has been engaged in more active and exciting pursuits, whatever they may have been—politics, profession, commerce, or anything else—mere reading, without any specific object, is, by comparison, but dull work. In early life we read for some definite purpose, to make ourselves acquainted with a particular subject, or to obtain knowledge which is to be applied to the attainment of something that we have in view afterwards. Undoubtedly the mere acquirement of knowledge is in itself agreeable; but something more than this is necessary, not only to keep the mind in a wholesome and vigorous state, but to happiness. Not only must the mental faculties be exercised, but it must be on a worthy subject, or with some ulterior view. It was better for Diocletian to plant cabbages than to do nothing; and it is to be supposed that Charles the Fifth derived some sort of comfort from his flying puppets and self-flagellations; but I suspect that, in spite of his misfortunes, Lord Bacon was not altogether unhappy while engaged in completing his philosophical works; and I cannot doubt that he was much less so than he would have been if he had shared the occupations and amusements of the Emperors.

CRITES. But Lord Bacon could not have been wholly and entirely occupied in the way which you have mentioned. He must still have had many hours of leisure on his hands.

EUBULUS. That is true. A man in a profession may be engaged in professional matters for twelve or fifteen hours daily, and suffer no very great inconvenience beyond that which may be traced to bodily fatigue. The greater part of what he has to do (at least it is so after a certain amount of experience) is nearly the same as that which he has done many times before, and becomes almost matter of course. He uses not only his previous knowledge of facts, or his simple experience, but his previous thoughts, and the conclusions at which he had arrived formerly; and it is only at intervals that he is called upon to make any considerable mental exertion. But at every step in the composition of his philosophical works Lord Bacon had to think; and no one can be engaged in that which requires a sustained effort of thought for more than a very limited portion of the twenty-four hours. Such an amount of that kind of occupation must have been quite sufficient even for so powerful a mind as that of Lord Bacon. Mental relaxation after severe mental exertion is not less agreeable than bodily repose after bodily labour. A few hours of *bonâ fide* mental labour daily will exhaust the craving for active employment, and will leave the mind in a state in which the subsequent leisure (which is not necessarily mere idleness) will be as agreeable as it would have been irksome and painful otherwise.

CRITES. And what limits do you place to mental exertion of the kind to which you allude?

EUBULUS. I do not see that it is possible to lay down rules for the mind in that respect, more than for the body; so much must depend on its original powers, on the physical condition of the individual, and on his previous training. Those whose early education has been defective for the most part labour under a disadvantage from not having acquired the habit of attention at that period of life when habits are most easily established. A vast effort may be made for a short time. But great things are accomplished more frequently by moderate efforts persevered in, with intervals of relaxation during a very long period. I have been informed that Cuvier was usually engaged for seven hours daily in his scientific researches; but these were not of a nature to require continuous thought. Sir Walter Scott, if my recollection be accurate, describes himself as having devoted about six hours daily to literary composition, and his mind was then in a state to enjoy some lighter pursuits afterwards. After his misfortunes, however, he allowed himself no relaxation, and there can be little doubt that this over-exertion contributed, as much as the moral suffering which he endured, to the production of the disease of the brain, which ultimately caused his death. Sir David Wilkie found that he was exhausted if employed in his pecular line of art for more than four or five hours daily; and it is probable that it was to relieve himself from the effects of too great labour that he turned to the easier occupation of portrait-painting. In fact, even among the higher grades of mind there are but a few that are capable of sustained thought repeated day after day for a much longer period than this.

CRITES. I conclude that you use the words *thought* and *thinking* in their more strict sense as implying not simply attention, but also that the mind is actively employed in observing and comparing facts, reasoning on them, and deducing conclusions from them.

EUBULUS. Certainly. I refer to an exercise of the mind beyond that which is required for learning what has already been proved, and following in the steps of those who have gone before us; and this being the case, the explanation of what I have just mentioned is sufficiently obvious. Mere attention is an act of volition. Thinking implies more than this, and a still greater and more constant exercise of volition. It is with the mind as it is with the body. Where the volition is exercised there is fatigue; there is none otherwise: and in proportion as the volition is more exercised, so is the fatigue greater. The muscle of the heart acts sixty or seventy times in a minute, and the muscles of respiration act eighteen or twenty times in a minute, for seventy or eighty, or in some rare instances even for a hundred, successive years; but there is no feeling of fatigue. The same amount of muscular exertion under the influence of volition induces fatigue in a few hours. I am refreshed by a few hours' sleep. I believe that I seldom, if ever, sleep without dreaming. But in sleep there is a suspension of volition. If there be occasions on which I do not enjoy the full and complete benefit of sleep, it is when my sleep is imperfect; when my dreams are between waking and sleeping, and a certain amount of volition may be supposed to be mixed up with the phantoms of the imagination.

CRITES. But are you right in limiting the capability of the higher kind of intellectual labour in ordinary cases to so low an average as from four to five hours daily? You referred to the instance of Sir Walter Scott; but, if I remember rightly, Sir Walter has a remark in his diary that, "as to his composition, it was seldom five minutes out of his head during the whole day."

EUBULUS. This remark was made after his misfortunes, and when it is well known that he was exerting himself beyond his powers. But let us refer to the whole passage. He says, "If any one asks me what time I take to think of the composition, I might say, in one point of view, it was seldom five minutes out of my head in the whole day; in another, it was never the subject of serious consideration at all, for it never occupied my thoughts for five minutes together except when I was dictating."*

This brings us to the consideration of another faculty of the mind, a faculty than which there is none more important: in which I will not say that there is no thinking at all, but certainly nothing like intense thought. The imagination is here more at work than the reasoning powers, and it is to this faculty, which in a greater or less degree every one possesses, the child as well as the man, I might even say the idiot as well as the philosopher, that, being properly employed, we owe the greatest contributions of genius to literature and science. As you have already referred to Sir Walter Scott, I will take him for an example. The fictions of the "Lay of the last Minstrel," or of "Waverley," cannot be supposed to have been the result of any exercise of volition. They presented themselves to his mind with no more effort than that which precedes the visions of a dream.

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* "Diary," February 1831.

CRITES. Then you consider his novels and poems to have been the result of a sort of waking dream.

EUBULUS. By no means. In sleep there is no volition at all. The phantoms of the imagination are never stationary. They succeed each other with such rapidity, that they can never be made the subject of contemplation; and very often there is no connection (that is, none that we can trace,) between that which comes first and that which follows. That there really are certain laws which regulate their production, I do not doubt, as there are laws which regulate all the phenomena of the creation; but whatever these laws may be, we know little, and generally nothing, of them. But when awake we have the power of arresting the current of the imagination; we can make the objects which it presents to us the subject of attention; we can view them under different aspects, and thus perceive in them resemblances, relations, and analogies which we could not have perceived otherwise. Hence new objects are presented to us, not at random, but having a certain connection with those by which they were preceded; and from these we can reject one and select another, and go back to that which we had previously rejected. Our minds are so constructed, that we can keep the attention fixed on a particular object until we have, as it were, looked all around it; and the mind that possesses this faculty in the greatest degree of perfection will take cognizance of relations of which another mind has no perception. It is this, much more than any difference in the abstract power of reasoning, which constitutes the vast difference which exists between the minds of different individuals. This is the history alike of the poetic genius and of the genius of discovery in science. "I keep the subject," said Sir Isaac Newton, "constantly before me, and wait until the first dawnings open by little and little into a full light." It was thus that, after long meditation, he was led to the invention of fluxions, and to the anticipation of the modern discovery of the combustibility of the diamond. It was thus that Harvey discovered the circulation of the blood, and that those views were suggested to Davy which are propounded in the Bakerian lecture of 1806, and which laid the foundation of that grand series of experimental researches which terminated in the decomposition of the earths and alkalis.

Crites. If I understand you rightly, you suppose that the mind, under the circumstances which you mention, is to a great extent in a passive state, objects being presented to it, or conceptions arising in it, which are associated according to certain laws, which differ according to the peculiar structure of individual minds, but which are independent of any direct act of volition, and that the latter is exercised only in keeping the object or conception in view while its various relations gradually unfold themselves to our observation. But it seems to me that on some occasions a still more remarkable process takes place in the mind, which is even more independent of volition than that of which we are speaking; as if there were in the mind a principle of order which operates without our being at the time conscious of it. It has often happened to me to have been occupied by a particular subject of inquiry; to have accumulated a store of facts connected with it; but to have been able to proceed no further. Then, after an interval of time, without any addition to my stock of knowledge, I have found the obscurity and confusion, in which the subject was originally enveloped, to have cleared away; the facts have seemed all to have settled themselves in their right places, and their mutual relations to have become apparent, although I have not been sensible of having made any distinct effort for that purpose.

EUBULUS. What you have now described has occurred repeatedly to myself. It is certainly not very easy to comprehend the nature of this mental operation. Is it that the subject every now and then comes before us, and is considered without our recollecting it afterwards?—or is it, as a philosophical friend has suggested, that in the first instance we are perplexed by the multiplicity of facts presented to us, and that after an interval of time those of less importance fade away, while the memory retains those which are essential, in the subsequent arrangement or classification of which, being thus rendered more conspicuous, there is no difficulty?

CRITES. The latter seems to be the more probable explanation of the two. At the same time, it must be admitted that they are not incompatible with each other.

Yet we may well doubt whether there be not something more than this. Observe what happens during sleep. However vague and unconnected dreams may be, there is sometimes so much coherence in them, that they are very like realities. You hold a conversation with another person, who, in answer to what you say, uses an argument or makes an observation which you believe to be erroneous, and contradict. This is only one of many examples of the same kind which dreams afford.

Eubulus. With reference to such dreams, Dr. Johnson has somewhere observed that the dreamer must have invented the argument used against himself without being aware that he had done so. This, however, is merely a statement of the fact, and no explanation of it. A late writer, whose mind had in it more of ingenuity than of philosophy, published a thick volume, to prove that each hemisphere of the cerebrum has a separate mind, and that on these occasions the two hemispheres might be considered as conversing with each other.* The work to which I allude, however fantastic it may be, contains many curious illustrations of mental phenomena. But I do not believe the hypothesis, or rather, I should say, that it is not in my nature to believe it. It seems to me that the question as to the oneness and individuality of the mind is very clearly and unanswerably stated by Father Buffier.† It is one of those fundamental truths which are inherent in us, and defy all argument; which I can no more help believing than I can help believing in the external world, or even in my own existence.

Crites. The subject of dreams is one of great interest, and I shall be glad if we can have the opportunity of discussing it hereafter. At present I would rather revert to a former part of our conversation.

Admitting all that you say as to the advantage of contemplative habits, still you surely do not mean to say that these are more important than the capability of forming a right judgment of the thing before us, and of reasoning accurately?

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* On the Duality of the Mind, by A. L. Wigan, M.D., 1844.

† Traité des Premières Vérités. Deuxième partie, ch. 10.

EUBULUS. Certainly not. But then it seems to me that in all cases in which we have to arrive at a conclusion by comparing the evidence on one side with that on the other (and these include all branches of human knowledge except pure mathematics), nothing contributes so much to accurate reasoning as the habits of which we are speaking. The principal defect in those who reason inaccurately is that so happily illustrated by the fable of the two knights disputing about the gold and silver shield. They do not see, or they do not take into the account, the whole of the facts on which their conclusion is to be founded. Who is so little liable to fall into this error as the individual who keeps the subject to which his inquiries are directed constantly before him, until all its relations gradually are presented to his view? Observe, that I am speaking of a well-regulated imagination, which is not led astray by prejudice or passion, or fanciful analogies. The ill-regulated imagination of inferior minds is quite a different matter, and produces nothing but enthusiasts, fanatics, and, I may add, impostors.

CRITES. But, unfortunately, it is these last classes of persons who, by means of their activity and earnestness, are often the most influential in the world. A fanatical monk persuaded the whole of Christendom to embark in the wild scheme of the Crusades. Lord George Gordon, a crazy fanatic, led the London mob to burn down Newgate, and nearly to involve the whole of the metropolis in the conflagration. It is not long since no small number of persons, and not merely those belonging to the uneducated classes, were led to believe that a dropsical old woman was about to be the mother of the real Shiloh; and, even at the present day, many thousand Mormonites attest their belief in the divine mission of a half-madman and half-impostor in the person of Joe Smith. How many similar histories may be furnished by any one who studies the past history of the human race!

Eubulus. I am afraid that we need not go so far back as the age of the Crusades, nor refer to the disciples of Joanna Southcote, or the Mormonites, for instances of such credulity on the part of a considerable portion of mankind. If we do not believe in astrology or witches, there are at the present day many who believe in things not supported by better evidence than these. There are epidemics of opinion as well as of disease, and they prevail at least as much among the well-educated as among the uneducated classes of society. The energy and sincerity of enthusiasts is powerful in all ages, and carries with it the conviction of that large portion of mankind who do not inquire and think for themselves. It is, indeed, a melancholy fact, that a great extension of education and knowledge does not produce any corresponding improvement in this respect. Still, in the end, good sense prevails. Errors and deceptions last only for a time. Those which disgrace one age vanish, and are succeeded by those which disgrace the next. But a truth once established remains undisputed, and society, on the whole, advances.

Crites. But does not what you have now stated tend to show that there is some defect in modern education? Might it not do more than it does towards the improvement of the reasoning faculty?

Eubulus. I doubt it. Education does a great deal. It imparts knowledge, and gives the individual worthy objects of contemplation for the remainder of his life. It strengthens his power of attention; and such is especially the case with the study of mathematics; and in doing so it cannot fail, to a certain extent, to assist the judgment. Still it seems to me, that to reason well is the result of an instinct originally implanted in us, rather than of instruction; and that a child or a peasant reasons quite as accurately on the thing before him and within the sphere of his knowledge as those who are versed in all the rules of logic. With regard even to mathematics, I much doubt whether they tend to improve the judgment on those subjects to which they are not immediately applicable. Dugald Stewart makes the following observation: — "In the course of my own experience I have never met with a *mere* mathematician who was not credulous to a fault, not only with respect to human testimony, but credulous also in matters of opinion, and prone on all subjects which he had not carefully studied, to repose too much faith in illustrious and consecrated names."* Nor is this at all difficult to explain. The principal errors of reasoning on all subjects beyond the pale of the exact sciences arise from our looking only on one side, or too exclusively on one side, of the question. But in mathematics there is no alternative. It has nothing to do with degrees of probability. The truth can be on one side only, and we arrive at a conclusion about which there is no possibility of doubt, or at none at all. In making these observations, however, do not suppose that I do not sufficiently estimate this most marvellous science, which, from the simplest data, has been made to grow up into what it now is by the mere force of the human intellect; the truths of which would have been the same if heaven and earth had never existed; would be the same still if they were now to pass away; and by means of which those branches of knowledge to which it is applicable have been brought to a state of perfection which others can never be expected to attain.

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* Moral Philosophy, 4th edition, 1827, vol. iii. p. 280.

Ergates. It certainly seems to me, as it does to Eubulus, that the faculty of reasoning correctly (or what is commonly called having a clear head) is for the most part a natural gift, and that it admits of being artificially improved only in a limited degree. Indeed, it admits of a question, whether modern education, instead of doing too little, does not, on the whole, err on the side of attempting to do too much? Sir Humphry Davy, when a boy, was placed under a schoolmaster who neglected his duties; and adverting to this subject in a letter addressed to his mother after he was settled in London, he says, "I consider it as fortunate that I was left much to myself as a child, and put on no particular plan of study, and that I enjoyed much idleness at Mr. Coryton's school. I, perhaps, owe to these circumstances the little talents I have, and their peculiar application. What I am I made myself. I say this without vanity, and in pure simplicity of heart."* John Hunter, who, in the department of science, is one of the most remarkable individuals whom this country has produced, had applied very little to study of any kind until he came to London, and began that of anatomy, under his brother William. Like Davy, he was distinguished for his industry, the originality and comprehensiveness of his views, and the clearness of his intellect. Would not these faculties have been cramped and deranged, rather than improved, by a more systematic education?

EUBULUS. In accordance with your view of the matter, Sir Walter Scott has somewhere observed, that "the best part of every man's education is that which he gives himself;" and I willingly admit that, among those whose intellect is of the higher order, there are many who would ultimately accomplish greater things if in early life they were left more to their own meditations and inventions than is the case among the more highly educated classes of the community.* Ferguson, the astronomer and mechanical philosopher, told Dugald Stewart that "he had more than once attempted to study the 'Elements of Euclid,' but found himself quite incapable of entering into that species of reasoning. He satisfied himself of the truth of the various geometrical propositions of which he had daily occasion to make use, by means of compasses and other mechanical contrivances." † It is well known that Ferguson had little or no education. If it had been otherwise, it is more than merely probable that he would have been held to be a dunce, and that the peculiar talent by which he acquired his reputation would have been crushed or wasted. A high education is a leveller, which, while it tends to improve ordinary minds, and to turn idleness into industry, may, in some instances, have the effect of preventing the full expansion of genius. The great amount of acquirement rendered necessary by the higher class of examinations, as they are now conducted, not only in the universities, but in some other institutions, while it strengthens the power of learning, is by no means favourable to the higher faculty of reflection. But it must be borne in mind, that in this world none of our schemes are perfect, and that in all human affairs we must be content to do that which is best on the whole. Geniuses are rare exceptions to the general rule; and a mode of education, which might be well adapted to the few who think for themselves, would be ruinous to the unreflecting majority. As to making one system of education for one class of minds, and another for another, there are, if I may be allowed to use a metaphorical expression, mechanical difficulties in the way. Besides, who is to know what a boy's mind is, or what is his peculiar turn, until the greater part of his education is completed?

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* Memoir, by John Davy, M.D., vol. i., chap. 1.

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* See additional note A.

† Stewart's Moral Philosophy, 1814, vol. ii. p. 196.

Crites. I agree with you to a great extent, but not altogether.

> "Est quâdam prodire tenus si non datur ultra."

I apprehend that the changes as to education, which are now in progress in this country, of which the principal result will be the introduction of new branches of study into our schools and colleges, will do much towards remedying the defects of the present system. Those who have it not in their power to excel in one thing will find that they may, nevertheless, excel in another; and each individual will naturally, and almost unconsciously, direct his attention to those subjects which are most congenial to his taste, and best adapted to the peculiar structure of his mind.

THE SECOND DIALOGUE.

Mind and Matter. — Natural Theology. — Views of Sir Isaac Newton. — Reasons for regarding the Mental Principle as distinct from Organization. — The Influence of the one on the other not sufficiently regarded by Metaphysicians.—Relations of the Nervous System to the Mental Faculties. — Speculations of Hook, Hartley, &c.—The Brain not a single Organ, but a Congeries of Organs cooperating to one Purpose. — Physiological Researches of Magendie and Flourens.—The different Capacities of Individuals for the Perception of Colours, Musical Sounds, &c., probably dependent on different Organization of the Brain.— Supposed Connection of the Cerebellum with Locomotion. — Is there an Organ of Speech? — Instances of Want of Speech in those who were neither Deaf nor Idiotic. — Stammering. — Memory. — Dr. Hook's Speculations. — Affections of the Memory from Cerebral Disease or Injury. — Impressions on the Brain not sufficient for Memory, unless accompanied by Attention, which is an act of the Mind itself. — The Nature of the Physical Changes which occur in connection with the Memory beyond the reach of our Observation and Capacities.

It was on the day following that of the foregoing discussion that our friend invited us to accompany him to a spot in the neighbourhood which, from its greater elevation, afforded an extensive panoramic view of the whole of the surrounding country. Our road was by an easy ascent; the weather was fine; and, as we proceeded leisurely, we were able to combine the pleasures of conversation with those of breathing the fresh air and admiring the beauties of the scenery. When we had reached the summit of the hill, we were amply rewarded for the trouble of ascending it. It was one of those days which so frequently precede a fall of rain, when the transparency of the atmosphere renders distant objects unusually distinct, and apparently less distant than they really are. For twenty-five or thirty miles, on every side, the country lay before us, with its woods and meadows, villages and churches, as plain as if they had been represented on a map. The sun was at this time about two hours above the horizon, his beams being occasionally intercepted by some light clouds, the shadows of which sometimes fell on ourselves, and at other times were seen rapidly traversing the landscape below. A slender moon, not more than three days old, was seen following the sun towards the west.

"I never," said Eubulus, "find myself left to my own contemplations in a situation such as this without a feeling of wonder at myself and my own existence. Here am I, I mean I, who feel and think, pent up within the narrow dwelling of my own body, yet taking cognisance of things remote in space, not only of those which belong to our own world, but of those in the vast universe around us. Marvellous as this may be, let us wait but for a few hours, and we have what is still more marvellous. By the aid of a tube and a few glasses, I may become acquainted with other objects, suns and worlds, distant from us not only in space, but also in time, which I see not as they now are, but as they were many thousands of years before I myself was in existence. I do not say that such reflections prove more than may be proved in other ways, but they certainly impress my mind more strongly with the conviction that, as a percipient, conscious, and intelligent being, I belong to a mode of existence wholly different from that of the senseless bodies by which I am surrounded, and that (even independently of the evidence afforded by revelation) there is nothing unreasonable in the universal expectation of mankind (so universal, indeed, as to have almost the character of an instinct) that there is something in us which will remain, and be capable of perception and thought, and it may be of pure and high aspirations, when the gross material fabric with which it is now associated has become resolved into its original elements."

CRITES. I can perfectly enter into the sentiments which you have now expressed. The properties of mind are so wholly different from those of matter, the two are so completely asunder, that they do not admit even of the most distant comparison with each other. I can easily imagine that motion, gravitation, heat, light, electricity, magnetism, chemical attraction, have something in common; that they are (as, indeed, Mr. Grove has shown them to be) so far of the same essence as to be convertible into each other; but it is to me wholly inconceivable that any exaltation of the known properties of matter should produce the one conscious indivisible being which I feel myself to be. When the materialist argues that we know nothing of mind except as being dependent on material organization, I turn his argument against himself, and say that the existence of my own mind is the only thing of which I have any actual and indubitable knowledge. I cannot help believing in the existence of an external world. Still the hypothesis of its non-existence implies no contradiction, whereas it is as much a contradiction to doubt the existence of my own mind as it would be to doubt that two and two are equal to four. You must excuse me, however, if I say that it occurred to me yesterday (though I did not notice it at the time) that in one of your remarks, you seemed to identify the functions of the mind with those of the body more than you are disposed to identify them at present. I allude to the comparison which you made of the effect produced by long-continued voluntary effort in the maintenance of muscular contraction, and in the operations of the intellect.

EUBULUS. When we say that we believe in the independent existence of the percipient and thinking principle, I apprehend that neither you nor I can mean to deny the obvious fact of it having a connection with our bodily organs, by means of which it receives impressions from without, and operates in return on bodies external to itself.* This, however, is not peculiar to such humble beings as ourselves. When I contemplate the evidence of intention and design which present themselves everywhere around us, but which, to our limited comprehensions, is more especially manifested in the vegetable and animal creations, I cannot avoid attributing the organization of the universe to an intelligent being, whose power and knowledge are such that it is impossible for me to form any adequate conception of them, any more than I can avoid referring the motions of the planets and stars to the same law of gravitation as that which directs the motions of our own globe. But no one, I apprehend, will maintain that the mind of the Deity depends on a certain construction of brain and nerves; and Dr. Priestley*, the most philosophical of the advocates of the system of materialism, ventures no further than to say that we have no knowledge on the subject. But, to use the words of Sir Isaac Newton, "This powerful ever-living agent being in all places, is more able to move the bodies within his boundless uniform sensorium, and thereby to form and reform the parts of the universe, than we are, by our will, to move the parts of our own bodies." The remainder of the passage from which I have made this quotation, is not without interest, as indicating the view which Newton took of the matter in question:—"And yet we are not to consider the world as the body of God, or the several parts thereof as the parts of God. He is an uniform being, void of organs, members, or parts, and they are his creatures, subordinate to him and subservient to him, and he is no more the soul of them than the soul of man is the soul of the species carried through the organs of sense into the place of its sensation, where it perceives them by its immediate presence, without the intervention of any third thing. The organs of sense are not for enabling the soul to perceive the species of things in its sensorium, but only for conveying them thither; and God has no need of any such organs, he being everywhere present to the things themselves."*

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* See Additional Note B.

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* Priestley, Disquisitions on Matter and Spirit, sect. 9.

Ergates. I can perfectly well conceive the existence of mind independently of corporeal organs; but our actual experience of it is only under the last-mentioned condition; and in no other way can it be the proper object of study. It seems to me that the best writers on the philosophy of the mind have erred in considering the mind too abstractedly, not taking sufficiently into the account the physical influences to which it is subjected.

Eubulus. There are, however, those who form an exception to this rule; for example, Descartes, Hartley, and that universal genius

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* Optics, book iii. p. 379, 4th edition.

Dr. Hook. Moreover, Dr. Reid's inquiry into the human mind is founded on a critical examination of the several senses; and Dr. Berkley's essay on the corporeal function of vision contains the germ of all his metaphysical investigations.

Crites. The two latter were certainly anything but materialists. The others to whom you allude have been guilty of an error the very opposite to that which I have mentioned, giving as an explanation of mental phenomena that which not only has no foundation in observation and experience, but which is, indeed, no explanation at all. When I learn from Hartley that thought is a vibration of the fibres of the brain; and from Hook that there is a matter in the brain intended to receive the impressions of sound, which may be compared to the bells and vases which Vitruvius describes as being placed in the ancient theatres*; and that thinking is the radiation of the soul from one part of the brain to another, I do not find myself to be a whit wiser than I was before.

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* Posthumous Works.— Lectures on Light, sect. 7.

EUBULUS. That may be true. But when Hook states that there are various structures in the brain adapting it for the part which it has to perform in connection with the mental principle,—that there is an organ of memory, for example,—I find so many facts which are favourable to this opinion, that I cannot but regard it as more than a mere hypothesis. As to this point, however, Ergates has had greater opportunities than I have had of obtaining information; and I should be well pleased to hear what he has to say on the subject.

ERGATES. If I comply with your wishes, I must make some small demand on your patience, as, although what I have to say may not be much in substance, it cannot be compressed into a very few words.

We may safely assume, as an established fact, that it is only through the instrumentality of the central parts of the nervous system that the mind maintains its communication with the external world. The eye is necessary to sight, and the ear to hearing; and so with the other organs of sense. But the eye does not see, and the ear does not hear; and if the nerve which forms the communication between any one organ of sense and the brain be divided, the corresponding sense is destroyed. In like manner it is from the brain that all those impulses proceed by which the mind influences the phenomena of the external world. The division of the nerves which extend from the brain to the larynx destroys the voice. The division of the nerves of a limb causes the muscles of the limb to be paralysed, or, in other words, withdraws them from the influence of the will; and the division of the spinal chord destroys at once the sensibility and the power of voluntary motion in all the parts below the part at which the division is made.

If we investigate the condition of the various orders of vertebrate animals, which alone admit of a comparison with our own species, we find, on the one hand, great differences among them with regard to both their physical and mental faculties, and on the other hand a not less marked difference as to the structure of their brain. In all of them the brain has a central organ, which is a continuation of the spinal chord, and to which anatomists have given the name of *medulla oblongata*. In connection with this there are other bodies placed in pairs, of a small size and simple structure in the lowest species of fish, becoming gradually larger and more complex as we trace them through the other classes, until they reach their greatest degree of development in man himself. That each of these bodies has its peculiar functions there cannot, I apprehend, be the smallest doubt; and it is, indeed, sufficiently probable that each of them is not a single organ, but a congeries of organs, having distinct and separate uses. Experimental physiology, joined with the observation of the changes produced by disease, has thrown some light on this mysterious subject. There is reason to believe that, whatever it may do besides, one office of the *cerebellum* is to combine the action of the voluntary muscles for the purpose of locomotion. The *corpora quadrigemina* are four tubercles, which connect the *cerebrum*, *cerebellum*, and *medulla oblongata* to each other. If one of the uppermost of these bodies be removed, blindness of the eye of the opposite side is the consequence. If the upper part of the cerebrum be removed, the animal becomes blind, and apparently stupefied, but not so much so but that he may be roused, and that he can then walk with steadiness and precision. The most important part of the whole brain seems to be a particular portion of the central organ or *medulla oblongata.* While this remains entire, the animal retains its sensibility, breathes, and performs instinctive motions. But if this small mass of the nervous system be injured, there is an end of these several functions, and death immediately ensues. These facts, and some others of the same kind, for a knowledge of which we are indebted to modern physiologists, and more especially to M. Magendie and M. Flourens, are satisfactory as far as they go, and warrant the conclusion that there are various other organs in the brain, designed for other purposes, and that if we cannot point out their locality, it is not because such organs do not exist, but because our means of research into so intricate a matter are very limited.

CRITES. Your proposition being granted, and not denying that there may be original differences in the mental principle itself, we perceive to how great an extent the propensities and characters of individuals may depend on their physical organization. One person, for instance, may have a nicer perception of colours than another in consequence of the organ by which colours are distinguished being in the one more, and in the other less, developed.

ERGATES. Or the organ may be so imperfect that the perception of colours may be altogether wanting. In fact, examples of such imperfection are not very uncommon. There are persons who can recognise no difference beyond that of mere light and shade, so that when a scarlet cloth is laid out on the green turf they cannot distinguish even these two complementary colours from each other. The great difference which exists in different individuals as to the perception of musical sounds, or the power of numerical calculation, is best explained by attributing it to a difference of organization; and it is probable that the imperfection or absence of other faculties which we occasionally meet with is to be explained in the same manner. For example, if there be a part of the brain whose office it is to combine the action of muscles for the purpose of locomotion, it is a fair conclusion that there is some other part of it answering the same purpose as to the muscles of speech; an organ which, if not peculiar to them, is most complete and perfect in the human race, the "μεροπες ανθρωποι."

Crites. If so, an imperfection or absence of this organ should be a cause of dumbness. But I have understood that dumb persons are either those who are congenitally deaf, so that they cannot hear the sounds which they are required to imitate, or those who are idiotic, and deficient in other faculties as well as in this.

Ergates. What you have stated is undoubtedly the general rule. There are, however, cases of incapability of articulate speech which cannot be referred to either of these categories. There are individuals who, having suffered from disease of the brain, are unable to express their thoughts by speech, although their faculties being little or not at all impaired otherwise, they have a perfect comprehension of what others say, and of what they wish to say themselves. Some of them can utter a few words, others none at all, and others again, when intending to say one word, use another. But there are other cases still more remarkable, the facts of which may well lead us to believe that the organ of speech, if not originally and congenitally wanting, has been at any rate from the beginning so imperfect as to be useless. Two examples of what I have now mentioned have come under my own observation. Several years, ago I saw a little boy, then about five years old, whose faculty of speech was limited to the use of the word *papa.* This, it may be observed, is so simple a sound, that dolls are made, by some very simple mechanism, to produce it very distinctly. I soon ascertained that the sense of hearing was perfect, and that there was nothing peculiar in the formation of the soft palate, mouth, and lips. There was no want of inclination to speak, but the attempt to do so produced sounds which were wholly inarticulate. So far was the child from being deficient as to his powers of apprehension, that he seemed to be even beyond what children of the same age generally are in this respect. Although he could not speak himself, he understood perfectly what was said to him by others, and expressed his answers by signs and gestures, spelling with counters monosyllabic words which he was incapable of uttering. I should add, that the external senses and powers of locomotion were perfect, and that all the animal functions were properly performed. The only other sign of disease or imperfection of the nervous system was that, for two or three years before I saw him, the child had been subject to fits or nervous attacks, attended with convulsions, but which (as I was informed) his medical attendant in the country regarded as having the character of hysteria rather than that of epilepsy.

I have had no other opportunity of making my own observations on the case; but eight years afterwards I was informed, on good authority, that he was still unable to speak, though he had made much progress otherwise; and that, among other acquisitions, he wrote beautifully, and was very clever in arithmetic.

The other case to which I have referred was that of a girl, who, at the time of my seeing her, was eleven years of age. She had no faculty of speech, uttering merely some inarticulate sounds, which her parents in some degree understood, but which were wholly unintelligible to others. It was easily ascertained that her sense of hearing was perfect, and that there was no defect in the formation of the external organs. After a careful examination, I was satisfied that the parents were correct in saying that she comprehended all that was said to her. She was perfectly tractable and obedient, and did not differ either in her appearance, or as to her general behaviour, from other intelligent children. Being in an humble sphere of life, it seemed that very little trouble had been taken with her education; still, when I placed before her a book which she had never seen before, and desired her to point out different letters, she did so with readiness and accuracy, making no mistakes. She had never suffered from fits of any kind, nor were there any indications of cerebral disease or other physical imperfection. Her parents said that from her earliest age she had been as she was when I saw her, equally intelligent, but incapable of speech.

EUBULUS. The facts which you mention are very interesting; and it seems to me that they throw light on at least some cases of stammering, in which we may suppose that the organ of speech is more or less imperfect, although it may be not altogether wanting. But let us go back to Dr. Hook: he says,—"I suppose memory to be as much an organ as the eye, ear, or nose, and to have its situation (in the brain) somewhere near the place where the nerves from the other senses concur and meet." He then goes on to explain in detail, that the soul, or first principle of life, though it be an incorporeal being, yet, in performing its actions, makes use of corporeal organs; that in the brain there is a repository of impressions made by the senses for the purpose of memory; but that no idea can be stored up in this repository without the directing power of the soul, and that this act of the soul is what is called attention.

Ergates. I am not prepared to admit, nor is it worth while to discuss, the explanation which Hook has given of what goes on in the brain in connection with the memory, and other mental processes, it being for the most part fantastical, and unworthy of so great a philosopher; but that he and others are correct in regarding memory as being in some way connected with our physical organization, there can be, I conceive, not the smallest doubt.

The eye, the ear, and the other organs of sense, are physical instruments by means of which impressions are communicated through the nerves to the brain. Without this apparatus, in our present state of existence, there would be no sensations; no knowledge of anything external to ourselves. It does not, however, follow that the brain itself feels, or that it performs any other than a subordinate office, conveying the impressions received from the organs of sense to a superior principle in connection with it. Memory is a recurrence of sensations, which existed formerly, produced by the operation of some internal changes, after the causes, by which the first sensations were excited, have ceased to exist. These renewed sensations are (with some rare exceptions) fainter and less distinct than those in which they originated. There is also this difference between them, that the renewed sensations are subject to the influence of volition, vanishing at once on the slightest effort being made to direct the attention to anything else; whereas we have no such power over the impressions which are made on our senses by the immediate presence of external objects. Notwithstanding these points of difference, it is plain that memory is closely allied to sensation, and the resemblance between the two orders of phenomena is so great as to justify the suspicion that the nervous system is instrumental in producing the one as well as the other; while a multitude of facts show that the suspicion is well founded.

A blow on the head may destroy the memory altogether, or (which is more usual) it may destroy it partially, or it may interrupt its exercise for a certain time, after which it may be gradually, or even suddenly, restored. After fever, also, and some other bodily ailments, the memory is not unfrequently impaired or lost. A gentleman found that he had lost the power of vision in one eye. Then he regained it partially in that eye, but lost it in the other. Afterwards he partially regained it in the eye last affected. He could now see objects when placed in certain positions, so that the image might fall on particular parts of the retina, while he was still unable to see them in other positions. These facts sufficiently prove the existence of some actual disease. But observe what happened besides: his memory was affected as well as his sense of sight. Although in looking at a book he recognised the letters of the alphabet, he forgot what they spelled, and was under the necessity of learning again to read. Nevertheless, he knew his family and friends; and his judgment, when the facts were clear in his mind, was perfect.

In another case, a gentleman who had two years previously suffered from a stroke of apoplexy (but recovered from it afterwards) was suddenly deprived of sensation on one side of his body. At the same time he lost the power, not only of expressing himself in intelligible language, but also that of comprehending what was said to him by others. He spoke what might be called *gibberish,* and it seemed to him that his friends spoke *gibberish* in return. But while his memory as to oral language was thus affected, as to written language it was not affected at all. If a letter was read to him, it conveyed no ideas to his mind; but when he had it in his own hand, and read it himself, he understood it perfectly. After some time he recovered of this attack, as he had done of that of apoplexy formerly. He had another similar attack afterwards.

A blow on the head which causes insensibility generally affects the memory so far that when the patient has recovered from the state of insensibility he has no knowledge of the accident. But in some instances the effect of a blow on the head is merely to disturb the memory; the other functions being unimpaired. A groom in the service of the Prince Regent was cleaning one of some horses sent as a present to His Royal Highness by the Shah of Persia. It was a vicious animal, and he kicked the groom on the head. He did not fall, nor was he at all stunned or insensible; but he entirely forgot what he had been doing at the moment when the blow was inflicted. There was an interval of time, as it were, blotted out of his recollection. Not being able to account for it, he supposed that he had been asleep, and said so to his fellow servants, observing at the same time "that he must set to work to clean the horse, which he had neglected to clean in consequence of his having fallen asleep."

In other cases the effect of a blow on the head has been not only to erase from the memory the events which immediately preceded the accident, but also to prevent it retaining the impression of those which occurred immediately afterwards. A young man was thrown from his horse in hunting. He was stunned, but only for a few minutes; then recovered, and rode home in company with his friends, twelve or thirteen miles, talking with them as usual. On the following day he had forgotten not only the accident itself, but all that happened afterwards.

It would be easy to multiply examples such as these, both from my own experience, and from the observations of others; and from them it seems to be a legitimate conclusion, that the nervous system is instrumental in producing the phenomena of memory as well as those of sensation. They show also that it is not in every part of the nervous system, but in the brain, that memory resides. This faculty is injured by a blow on the head, or a disease affecting the brain; but not by an injury of the spine, or a disease of the spinal chord. The eyes may be amaurotic, but Milton and Huber retained the memory of objects which they had seen previously to their blindness. It is not the spinal chord, nor the nerves, nor the eye, nor the ear, but the brain, which is the storehouse of past sensations, by referring to which the mind is enabled to renew its acquaintance with events which are passed, and at the same time to obtain the means of anticipating, to a great extent, the events which are to come.

Crites. Your view of the matter then seems to be that impressions made on the organs of sense, and transmitted to the brain, produce some actual change in the minute organization of the latter, and that this is subservient and, in our present state of existence, essential to the memory.

Ergates. I do not see how the facts which I have mentioned, and a hundred others which I might mention, can be otherwise explained. What the actual changes in the condition of the brain may be, it is impossible for us to comprehend. Yet it is in no degree remarkable that such changes should take place. We see a tree which has been exposed for centuries to the heat of summer, and the cold of winter, and the influence of the winds and tempests. Every change of temperature, every gust of wind, every storm of rain or hail, and probably even every change in the electric condition of the atmosphere, must have left its mark behind by producing some slight alteration in its root, and trunk, and branches. We recognise only the general result, when we see the aged tree, with its fissured bark, and its branches inclined to that side from which it has been the least assailed by the wind. But a being of superior knowledge, and possessed of the faculties necessary for more minute and accurate observation, would be able to distinguish the effect of every individual impression made by the operation of the causes which have been enumerated, and of others more obscure.

In offering these remarks, however, let me not be misapprehended as giving our knowledge for more than it is actually worth, or as pretending to understand more than we understand in reality. In our present state of existence, in like manner as the eye, the ear, the touch, and the other organs of sense, and, I may add, the action of our muscles, are the means by which we obtain a knowledge of things external to ourselves; so it would appear that the organization of the brain is made subservient to the function of memory. As to what there may be besides, or what may be the capabilities of the mental principle, independently of organization, or how much may belong to the one, and how much to the other, I do not pretend to offer an opinion. In this, as in other matters belonging to this order of inquiries, we may be sure that our actual knowledge goes very little way. "We see these things through a glass darkly," and must be content humbly to acknowledge that the greater part is not only beyond the limits of our observation, but probably beyond those of our comprehension.

There is, however, one other point which is not beyond the reach of our capacities, and which ought not to be left unnoticed. It is clearly not sufficient that an impression should be transmitted to the brain for it to be remembered. An act of the mind itself is necessary for that purpose; and that, as Dr. Hook has observed, is the act of attention. It is only a small proportion of what we see, or hear, or feel, or imagine, that is not immediately forgotten, simply because there are very few of those things to which we pay more than a momentary attention, while to many of them we pay no attention at all. Now, as Eubulus explained to us on a former occasion, attention implies volition; that is, it is that effort of volition by which an object, which would otherwise have immediately passed away, is kept present to the mind during a certain period of time. Sensation and volition are the two functions by means of which the mental principle is enabled to maintain its communication with the external world. It is under the influence of volition that the contraction of muscles takes place for locomotion, speech, the procuring of food, and other purposes, and that the torpedo discharges his electric battery. Here there is an impulse communicated from the mind to the brain, from thence to the nerves, and from these to other organs, and producing a marked change in the condition of the latter; and, *à priori*, there is no reason to doubt that the operation of a similar cause may produce an equal change, though of another kind, and more permanent, in the minute structure of the brain itself.

CRITES. If these views be correct, and if your speculation also be correct as to the existence of special organs in the brain for the purposes of locomotion and speech, it would appear probable that there is a special organ for that of memory also.

ERGATES. That is true. But there our knowledge ends. We may, I suppose, take it for granted that there is no animal whose memory is equally capacious with that of man; and we know that, with the exception perhaps of the dolphin (of whose faculties we know nothing), there is no other animal in whom that portion of the cerebrum which we call its hemispheres, and which are bounded externally by the convolutions, is equally developed. It may be said, and not without some show of reason,—"Do not these facts seem to indicate where the faculty of memory resides?" Willis answered the question in the affirmative.* But observe how it is in birds. In them there are no convolutions; and the only part of the brain which can be said to correspond to the cerebral hemispheres of man, is merely a thin layer of cerebral substance expanded over some other structures which are developed to an enormous size. Yet we know that birds which are domesticated exhibit signs of considerable memory, parrots and cockatoos recognising individuals after a long interval of time; and that birds in their natural state return to their old haunts after their annual migrations. The exploits of the carrier-pigeons cannot be explained without attributing to them no small powers of observation, and of recollecting what they had observed. Perhaps future observations on the effects produced by disease of the brain in connection with affections of the memory may throw some light on this mysterious subject. At present we must be content to acknowledge that we know nothing as to the locality of the function, nor of the minute changes of organization which are connected with it.

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* "Multiplices cerebri plicæ et convolutiones requiruntur, nempe ut in istis, tanquam in diversis cellulis et apothecis sensibilium species reservari, atque illinc pro datâ occasione evocari queant. — *Willis*, *de Anatome Cerebri*, cap. 10.

THE THIRD DIALOGUE.

The Subject of Memory continued. — Sequence and Association of Ideas.—Suggestion of Ideas by internal Causes acting on the Brain by the Nerves, or through the Medium of the Blood.—Influence of Narcotics, Morbid Poisons, Lithic Acid, Impure Atmosphere, and other Physical Agents on the Condition of the Mind.—Such Inquiries not only of scientific Interest, but also of practical Importance.— Physical Causes of Mental Illusions. — Examples of false Perceptions referred to the Sight and other Senses.—Other Forms of Illusion more frequent in Cases of Mental Aberration than mere Deceptions of the external Senses. — Mr. Locke's Definition of Insanity not sufficiently comprehensive. — A too rapid Succession of Ideas, with Incapability of fixing the Attention, incompatible with correct Reasoning. — State of Mind in the so-called "Moral Insanity." — Question as to the Limits of Moral Responsibility.

THE conclusion of our journey had somewhat abruptly terminated our conversation. When we were assembled in the evening, the subject of it was thus resumed by Eubulus.

EUBULUS. Although some of the opinions which Ergates expressed this afternoon may be regarded as hypothetical, and not admitting of actual and positive proof, yet it must be owned that they are supported by many facts, and by some in addition to those which he has himself adduced. Especially his views as to the nature of memory seem to afford an explanation of some circumstances, relating to the connection of the mind with the body, which cannot well be explained otherwise.

For instance: we remember nothing of what occurred in infancy. That part of our life seems afterwards to be a blank in our existence; and it is not unreasonable to suppose that the brain, like some other of the organs of the newly born child, is in an unfinished state, and, therefore, not fitted to retain the impressions made on it during any considerable period of time.

Then the impressions made on the memory gradually become fainter and fainter as time elapses; and this is in accordance with the gradual alteration which our physical structure undergoes as we advance in life. If there be exceptions to the rule, they are such as tend to prove the rule itself. For example, where the recollection of an event which occurred long ago is unusually vivid, we say "it seems as if it had happened only yesterday," and, on the other hand, when the recollection of an event which occurred only lately is unusually faint, it appears to us at first that it happened long ago; and it is only after some consideration, and by recalling to our mind some other circumstances in connection with it, that we are enabled to correct the error.

ERGATES. Allow me to interrupt you for a moment by observing that, besides those which I have already mentioned (namely, diseases and injuries of the brain), there are other physical agents which prevent the impression of things, of which we are conscious at the time, from being imprinted on the memory. Thus, a drunkard either forgets altogether, or has only a vague recollection of the nonsense which he talked, and the follies of which he was guilty, on the previous day while under the influence of alcohol; and those who, for the purpose of undergoing a surgical operation, are placed under the influence of what are called anæsthetic agents, as ether or chloroform, although in most instances they appear to pass into a state of entire insensibility, in other instances groan and struggle, and give evident signs of suffering while the operation lasts, although they remember nothing of it afterwards, and can scarcely be persuaded that what they had so much dreaded is really completed.

EUBULUS. I cannot complain of the interruption, as the facts which you mention are very much to the purpose. But I was going on to observe, in connection with our present inquiry, that, without denying the generally received doctrines as to what metaphysicians have called the association or suggestion of ideas, still these do not explain the whole. How often does it happen that thoughts arise, and images present themselves to the mind, which cannot be traced as the immediate result of impressions on the external senses, or of anything that was passing in the mind previously. But may not this be explained by supposing that the brain, as the organ of memory, and therefore of the imagination, is liable to be influenced by physical impressions of various kinds communicated from other parts of the corporeal system besides the immediate organs of sense, through the medium of the nerves. Whoever will carefully inquire into what passes within himself, will, I suspect, be satisfied that there are many of his thoughts, and trains of thought, and, I may add, of the agreeable or disagreeable feelings with which they are associated, that cannot be accounted for otherwise.

ERGATES. Dreams present some striking examples of what you have now mentioned. You are awaked by a distressing dream, and find yourself labouring under the uncomfortable sensations occasioned by acid in your stomach. You take some magnesia, which neutralises the acid, then turn round, and enjoy a refreshing sleep. A lady had a small tumour in one leg. It was hard, well defined, exquisitely tender, so that even a slight pressure on it occasioned a severe pain, not only at the instant, but lasting a considerable time afterwards. It seemed to be a tumour of a peculiar kind, well known to surgeons as being occasionally found among the fibres of a nerve. This lady observed that she frequently awoke at night suffering from a frightful dream, which, although it related to some other and quite different subject, she could always trace to an accidental pressure on the tumour. In like manner children who labour under disease of the hip joint are often prevented from falling asleep by pains in the hip and knee, and painful startings of the limb; but when they are asleep, instead of these local symptoms, they are tormented by distressing dreams.

In cases such as these we must suppose that the order of the phenomena is as follows. An impression is made on a nerve, and from thence transmitted to the brain, producing in its minute structure certain changes, which affect the mind itself. But there is no doubt that the same effect may be produced without the intervention of the nerves, by the blood acting on the brain. Bichat has shown that the influence of the scarlet or arterial blood is necessary to the due performance of the cerebral functions. If dark-coloured, or venous blood, be substituted for it, and transmitted to the brain by the arteries, the animal lapses, — I will not say into a state of unconsciousness, for of that we know nothing, — but into a state of total insensibility to external impressions. This fact being established, we cannot be surprised that blood of an improper quality, or containing something which healthy blood should not contain, may disturb the functions of the brain, so as even to influence the mind itself. The habitual opium-taker, while his favourite drug is circulating in his vessels, instead of being set asleep is visited by soothing and luxurious thoughts, and enjoys the contemplation of the great things which he means to accomplish, but which he never accomplishes in reality; while the Lascar, under the influence of the East Indian hemp, is thrown into a state of excitement, and *runs a muck.** A man has been exposed to the contagion of small-pox. A minute quantity of the poison introduced into the blood acts as what the chemists call a ferment, and occasions the generation in it of a larger quantity of poison similar to itself; and when a certain degree of accumulation of it has taken place, there is a severe attack of fever, and the mind probably is haunted by the phantasms of delirium. After a time the poison is ejected from the blood, and is found deposited in pustules on the surface of the skin, and simultaneously with the appearance of the eruption the fever subsides, and the delirium subsides with it. In a person who has the misfortune of inheriting a gouty habit, or who has (which is a much more common case) produced it in himself by a lazy and luxurious life, there is a superabundance of lithic acid in the blood. This fact has been established by the researches of Dr. Garrod. Then uncomfortable thoughts are presented to his mind; he becomes fretful and peevish, a trouble to himself and, if he be not trained to exercise a moral restraint over his thoughts and actions, a trouble to every one about him. After a while the poison, as it were, explodes: he has a severe attack of gout in his foot; he is placed on a more prudent diet; the system is relieved of the lithic acid by which it was poisoned.

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* See Additional Note C.

Then the gout subsides; happy and cheerful thoughts succeed those by which the patient was previously tormented, and these continue until he has had the opportunity of relapsing into his former habits, and thus earning a fresh attack of the disease.

There is nothing more interesting in philosophy, nor more important as to practical purposes, than a just appreciation of the influence which the body exercises over the conceptions and feelings of the mind. Certain conditions of the former induce certain conditions of the latter. This is one of the principal trials to which we are here subjected; and according to our original construction, and some circumstances extraneous to ourselves, the trial is greater to some of us than it is to others. The result may be for good or for evil; and the practical question is, what can we do to promote the former, and lessen or prevent the latter? A diseased condition of the blood, where a morbid poison, as that of the small-pox, or the more terrible one of hydrophobia, has been admitted into it, will disturb the nervous system in spite of ourselves. But though this cannot, there is much that can, be helped. No one having the smallest capacity for observation can doubt the vast influence which the condition of the body has on the temper, and even on the moral character. There are certain states of the general health in which the simplest impressions on the organs of sense may be transmitted to the sensorium with something superadded to them, which produces a painful or uneasy feeling in the mind. There are others in which the effect is opposite to this. Hence we find one individual cheerful and hopeful under adversity, while another is unhappy and tired of life in the midst of all worldly prosperity. We are told, on high authority, of the necessity of self-control. We are also told how the effort of self-control may be rendered more easy by avoiding those sensual indulgences which tend to derange the functions of the animal system. This rule applies not merely to the profligate and the drunkard. There is many a person in whom a muddled intellect and a peevish temper may be traced to a too great indulgence of the appetite — to eating more than the stomach can digest; to drinking a bottle, or even half a pint of wine daily, and leading otherwise a lazy and luxurious life, but who would be found to have no contemptible powers of mind, and cheerful spirits, if restricted to a more abstemious diet, and to drinking nothing more stimulating than toast and water.

"Orandum est ut sit mens sana in corpore sanô."

We are all anxious to obtain rank, reputation, and wealth; but that for which we have most reason to be anxious, not only for our own sake, but also for that of others, is such a state of our bodily functions as will enable us to make use of our higher faculties, and promote in us happy and contented feelings. Happiness, after all, is not so unequally distributed in this world as to a superficial observer it seems to be. Poverty is terrible if it be such as to prevent the obtaining the actual necessaries of life. But the agricultural labourer who has enough of wholesome food, and warm clothing for himself and his family, and who has the advantage, which cannot be too highly estimated, of living in the open air, has more actual enjoyment of life than the inheritor of wealth, living in a splendid mansion, who has too much of lithic acid in his blood.

You will say that this is an oft-told story. But let us pursue the subject further, and we shall find that it has extensive ramifications, questions arising out of it appertaining not only to individuals, but to the whole fabric of society. Much is said at present as to the necessity of extending education, as the means of improving the condition of the multitude. I am not so great a heretic as to deny the advantages of knowledge and of early instruction, especially if it be combined with a proper training of the mind, so as to give the pupil habits of self-restraint. But there is much to be desired besides. Nothing can tend more to every kind of moral and intellectual degradation than the vice of gin-drinking so prevalent in some, but not in all, of the lower classes of society. In a conversation which I had with a very intelligent person employed by the "City Missionary

Society," whose location was in London among the inhabitants of St. Giles's parish, he said, " I assure you that there is scarcely any one of them who might not obtain a comfortable livelihood if he could leave off drinking gin." But see how one thing hangs upon another, and how one evil leads to another evil. Mr. Chadwick has shown that many are driven to drinking gin as affording a temporary relief to the feelings of depression and exhaustion produced by living in a noxious atmosphere: and he gives instances of individuals who had spontaneously abandoned the habit, when they were enabled to reside in a less crowded and more healthy locality, where they could breathe the pure air, instead of loathsome exhalations. The case of such persons is analogous to that of others, who become addicted to the use of opium, as the means of relief from bodily pain. Schools and churches are excellent things, but it is a vast mistake to suppose that they will do all that is required. There can be no feeling of contentment where there is an insufficient supply of wholesome food, and the " Temperance Society " can make few converts among those who live in crowded buildings, unventilated, and with imperfect drainage. Our late legislation has accomplished much, and as much as it can reasonably be expected to accomplish, towards the attainment of the first of these objects; and measures are now in progress which justify the expectation that eventually much good may be done in the other direction also.

CRITES. If such causes as those to which you lately referred may produce the effects which you have described; if an unhealthy state of the blood may give rise to delirium in fever, or illusions and horrors of mind in hydrophobia; if opium fills the mind with luxurious thoughts and visions having no foundation in reality; is it not probable that those greater and more permanent distractions of the mind which constitute the various forms of mental alienation may be traced to similar causes, that is, to some physical derangement affecting the organ of memory, and thus disturbing the imagination?

ERGATES. I cannot doubt that mental

alienation is generally the result of some wrong condition of the body, either functional or organic. Whether there be any exceptions to this rule, it would require more actual knowledge and experience of the subject than I pretend to possess, and more thought than I have bestowed on it, to enable me to determine. Probably there is no degree of knowledge, which it is in the power of man to attain, which could enable us to give a positive answer to this question. Putting it aside, however, for the present, there are abundant proofs that impressions may be made on the brain by other causes simulating those which are made on it by external objects through the medium of the organs of sense, thus producing false perceptions, which may, in the first instance, and before we have had time to reflect on the subject, be mistaken for realities. I have, indeed, already furnished an example of this in the visions presented to us in our dreams under the influence of physical causes.

Crites. I have been accustomed to believe that the latter are not, in reality, different from the objects commonly presented to us by the memory and the imagination; but seeming to be more distinct than usual, because during sleep we have no real objects with which we can compare them; in the same way as the deception of a panorama depends in part on the circular form of the painting, which excludes real objects from the view.

Ergates. In the visions belonging to our dreams there must be more than what you mention. A friend of mine, on awaking in the morning, saw standing at the foot of his bed a figure in a sort of Persian dress. It was as plainly to be seen, and as distinct, as the chairs and tables in the room, so that my friend was on the point of going up to it, that he might ascertain what, or rather who, it was. Looking, however, steadfastly at it, he observed that, although the figure was as plain as possible, the door behind it was plainly to be seen also, and presently the figure disappeared. Considering the matter afterwards, he recollected that he had had a dream, in which the Persian figure played a conspicuous part; and thus the whole was satisfactorily explained, it being evident that the dream, as far as this part of it was concerned, had continued after he was awake, and so that the perception of the imaginary object had existed simultaneously with that of the real ones. The same thing occurred to the same person on another occasion, and similar histories have been related to me by others. It is probable that this is the history of many startling and mysterious tales of ghosts and spirits.

But phantoms similar to those which belong to dreams, and which like them do not vanish by an effort of the will, may, under certain circumstances, present themselves to those who are actually awake. They may be the result of some actual organic disease of the brain. A gentleman, eighty years of age, had been for some time labouring under hypochondriasis, attended with other indications of cerebral disease. On a cold day in winter, while at church, he had a fit, which was considered to be apoplectic. He was taken home and bled, and recovered his consciousness, not being paralytic afterwards. He died, however, in a few days after the attack. During this interval, though having the perfect use of his mental faculties, he was haunted by the appearance of men and women, sometimes in one dress, sometimes in another, coming into, and loitering in the room. These figures were so distinct that, at first, he always mistook them for realities, and wondered that his family should have allowed such persons to intrude themselves upon him. But he soon by a process of reasoning corrected this error, and then talked of them as he would have talked of the illusions of another person. You have probably read the history of Nicolai, the bookseller of Berlin, who was haunted by visions of persons coming into his apartment, sitting down, and even conversing with him and with each other, and this during a period of several months. He also was at first taken by surprise, believing the phantoms to be real objects; but was soon enabled to convince himself that they were not so. His recovery was attributed to an improved state of his bodily health. I would not weary you by referring to other instances of the same kind. The late Dr. Alderson, in an essay which he published nearly fifty years ago, gave an account of several which had occurred under his own observation, in individuals of perfectly sane minds*, and others have been since then recorded by other authors.

Examples of deceptive appearances analogous to these, but less remarkable, are not very uncommon. A gentleman of my acquaintance, of a very sensitive and imaginative turn of mind, informed me that not unfrequently, when he had had his thoughts intensely fixed for a considerable time on an absent or imaginary object, he had at last seen it projected on the opposite wall, though only for a brief space of time, with all the brightness and distinctness of reality.

CRITES. If such a person had the misfortune to lose one of his family or a dear friend by death, how easy would it be for him to believe that he had been visited by his apparition afterwards! It is probable that when Swedenborg supposed that he met Moses or

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* An Essay on Apparitions, by John Alderson, M.D.

Elias in the street, some such object was really presented to his mind; and that even Joanna Southcote, and others who have been regarded as a low order of impostors, were not altogether impostors, but in part the victims of their own imaginations. The subject is one which may well excite our curiosity, and I should be glad to obtain some further insight into it. Under what circumstances do these visions, so like those of our dreams, present themselves to the waking person? where do they really exist, and what is their origin?

ERGATES. I have already stated that in the instance which I quoted on my own authority, the existence of actual disease of the brain was indicated by other symptoms. I have also mentioned that in that of the bookseller of Berlin there was a deranged state of the general health, and that he recovered under a course of medical treatment. In all the instances recorded by Dr. Alderson, the appearances were connected with actual bodily disease, which in two of them was of such a nature as especially to affect the nervous system. We may suppose the part actually affected to be the expansion of the nerve of sight in the retina of the eye; but it is more probable that it is that part of the brain itself which belongs to vision. In confirmation of this opinion, I may refer to a case recorded by Esquirol. A Jewess, who had been for a long time blind, became insane. Her illusions were of the sight, and she was constantly haunted by strange visions. After her death it was ascertained that the two optic nerves, from the part at which they are united within the head (which anatomists call their commissure), to their termination in the retinæ, were shrunk and wasted, so that they must have been wholly incapable of performing their functions.* I may also refer to another case which came under my own observation. A man met with an injury of the head, which, as the event proved, occasioned an extensive fracture in the basis of the skull, with such a displacement of bone as to press on the optic nerves, and render them wholly incapable of transmitting impressions to the brain. He was totally blind: otherwise he was not insensible, though he was slow in giving answers, and peevish when disturbed. On the second day after the accident, there were manifest symptoms of inflammation of the brain. He was in a state of great excitement, delirious, believing that he saw objects which did not exist; and he continued in this state until within a short period of his death.

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* Des Malades Mentales, vol. i. p. 195. edit. 1838.

CRITES. You have spoken of deceptions of the sight. Does nothing like this happen as to the other senses?

ERGATES. Certainly it does. The phantoms by which Nicolai was haunted are said to have conversed sometimes with him, sometimes with each other. I know a person, who amid the din of London streets occasionally has the perception of his being called by his name, so that he involuntarily turns round to see who calls him. Sir Henry Holland has given an account of a much more remarkable case. A gentleman had symptoms of an affection of the brain, which was attributed to an accidental blow on the head. On the following day he had pretty well recovered. Two days afterwards he was well enough to drive out in his carriage. But now, "for the first time after the accident, "there came on the singular *lusus* of two "voices, seemingly close to his ear, in rapid "dialogue, unconnected with any present "occurrence, and almost without meaning."* It is not uncommon to find persons, who, when their attention is not otherwise occupied, are distressed by the sounds of bells ringing. A gentleman, having what is commonly called a highly nervous temperament, had some teeth drawn while under the influence of chloroform. From that time, whenever his mind was not otherwise engaged, he was tormented by sounds as if a number of persons were yelling and hooting him. I have been told of a great musical genius, who, from the earliest period of his life, has never been without the sounds of music of the most harmonious kind. Then as to the other senses. I remember a man who had a severe blow on the head, occasioning the symptoms which surgeons attribute to a concussion of the brain. He recovered from the other consequences of the injury; but for a long time afterwards everything that he ate had a bitter taste. The case of another person who had a constant sensation as if a burning coal had been applied to his arm belongs to the same category.

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* Medical Notes and Reflections, 2d edit. p. 232.

Crites. But are not all such cases as those which you have described, to be considered as examples of mental derangement, though not in its worst and most aggravated form? and does not this correspond with the view of the subject taken by Locke, who regards this disease as affecting the imagination only, and not at all the reasoning faculty?

Ergates. Certainly not; for with the exception of Swedenborg, no one of the individuals whom I have just now mentioned mistook the deceptions as being connected with real objects. It is true, that some of those who are the subjects of mental derangement may see phantoms and hear strange voices; but they believe them to be realities, and cannot be persuaded that they are otherwise. Besides, as I am led to believe, it is not by this class of illusions that they are most liable to be tormented. As a morbid condition of the brain may produce the impression of visible objects, or of voices, which have no real existence, so it may also produce notions of a more complex and abstract character, and these may be constantly obtruded on the mind, so that the individual is unable to withdraw his attention from them, being, as it would seem, as much beyond the influence of volition as the muscles of a paralytic limb. Thus, one person believes himself to be ruined as to his worldly affairs, and that he and his family, though really in affluence, are reduced to extreme poverty; while another is persuaded that he is in possession of unbounded wealth, the consequence being that he is in danger of being ruined by extravagance; and a third is under the apprehension of his being accused of some dreadful crime, and perhaps seeks a refuge from his fears in self-destruction. It is more difficult to escape from the latter than from the former class of illusions, as the appeal lies not from one sense to another, but to a more refined process of thought and reflection, and the examination of evidence.

With regard to the opinion of Mr. Locke, (and I beg of you to observe that I speak not pretending to have any practical knowledge of the subject, but viewing it merely as a physiologist,) I own that it seems to me that he has laid down the rule too broadly, and that his explanation will not include the whole phenomena of insanity. In many insane persons, in addition to the illusions under which they labour, the capability of fixing the attention is almost entirely destroyed. The mind hurries on from one thing to another, as if it could find no resting-place; and under these circumstances it is plain that correct reasoning, which Locke defines as "the perception of the agreement or disagreement of our ideas," is out of the question. At the same time, this does not prove that the reasoning faculty is primarily affected. The increased intensity of the action of the nervous system, and the imperfect subjection of it to the will, sufficiently explain the whole. In one case, the mind may be occupied with a single object, or a single idea, or combination of ideas. In another case, a constant and rapid succession of different, and perhaps heterogeneous, ideas is presented to it: and the will is equally powerless to dismiss the single idea in the former case, and to stop the current of different ideas in the latter.

In confirmation of these views, it may be observed, that mental derangement is in numerous instances preceded by a disordered state of the general health; that it is not uncommon to find it alternating with diseases which affect merely the corporeal functions; or occurring under other circumstances which show that it must have been the result of mere physical agencies.

Eubulus. You have certainly adduced facts which justify the opinion that mental derangement may, and generally does, arise as the result of some actual physical imperfection, which we may suppose to be functional in some instances, organic in others; and I own that this is to me a very acceptable and consolatory view of the subject. But you cannot deny that in many instances it may be traced just as plainly to the operation of moral causes. The mind may break down all at once under some sudden affliction; or it may yield more gradually where the attention has been long and constantly and anxiously directed to some subject of unusual interest; and thus, the apprehension of poverty, the excitement arising from the unexpected possession of wealth, a gloomy and unholy religion, or a long indulgence in dreams of vanity and pride, may upset a vigorous intellect. Such facts as these cannot be questioned—and is not the conclusion from them inevitable?

Ergates. I am quite aware that mental derangement may in many instances be traced to moral causes as its original source, and far be it from me to assert that the one indivisible percipient and thinking being, which each of us feels himself to be, may not be in itself liable to changes, independently of any previous change in the material structure with which it is associated. Still, in the facts which you have mentioned, there is nothing to contradict the opinion that the essence of the disease, even when produced by the operation of moral causes, may be in the nervous system. A physician, whose knowledge of the subject is not surpassed by that of any one in Europe, assures me that "when mental derangement seems to have been induced by moral causes, it is generally to be presumed that there was originally an imperfect state of the brain, forming a predisposition to the disease." Then be it observed, that as the brain may influence the mind, so may the mind influence the brain. It is in this manner that volition acting on the brain first, and on the nerves afterwards, produces muscular contractions; that grief causes tears to flow from the lachrymal gland: and that the mouth becomes parched, and the digestion of the food interrupted, as a part of the consequences of anxiety of mind. So, also, persons have been known to suffer from imaginary hydrophobia, experiencing not a few of the symptoms of that terrible disease. In such cases the mind is affected first, the nervous system afterwards; the latter re-acting on the mind, and confirming and continuing the illusion. If the functions of the brain should be thus disturbed during a very long period of time, it may well be supposed that some actual change will at last be produced in its organization; and indeed, it is not very easy otherwise to understand how mental derangement, induced by moral causes, should be permanent, when the causes themselves have been in operation only for a limited period. Nor is there in this anything more remarkable than the fact of organic disease of the heart being in some instances distinctly to be traced to anxiety of mind.

CRITES. All this is to me a matter of curious speculation; but it leads to another subject, in which I feel a still greater interest; partly because, from the special nature of my pursuits, it is sometimes forced on my attention, and partly because out of it arise questions, which, as they affect our social system, are of great practical importance to us all. Some writers have described, under the name of Moral or Instinctive Insanity, a state of mind in which they say that there are no illusions, nor any affection of the intellect; but in which there is simply a perversion of the moral sentiments; the individual labouring under an impulse to perform certain extravagant and outrageous acts, injurious to himself or others; such impulse being irresistible, so that he is to be held as being no more responsible for his conduct than an ordinary lunatic. Now I own that, looking at the question merely as one who has some knowledge of human nature, and with no other aid than that of my own common sense, I am very much inclined to doubt the correctness of this doctrine, and I am certain that it is dangerous to admit the plea of irresponsibility for those who labour under this so-called Moral Insanity, to the extent to which Dr. Prichard and others have claimed it for them. Observe, that I use the term Moral Insanity not as comprehending cases in which there is a belief in things that do not exist in reality, or cases of idiotcy, or those approaching to idiotcy; but limiting it strictly and exclusively to the definition given by writers on the subject. The law makes a reasonable allowance for the subsiding of passion suddenly provoked. But we are not, therefore, to presume that the same allowance is to be made for those in whom a propensity to set fire to their neighbours' houses, or commit murder, is continued for months, or weeks, or even for hours. Is it true that such persons are really so regardless of the ill consequences which may arise, so incapable of the fear of punishment, and so absolutely without the power of self-restraint, as they have been sometimes represented to be? If not, there is an end of their want of responsibility. Let me refer here to the instance of the gouty patient, some time since adduced by Ergates. Under the influence of his disease every impression made on his nervous system is attended with uneasy sensations. If such a person has exerted himself to acquire the habit of self-control, the evil ends with himself; but otherwise, he is fractious and peevish; flies into a passion, without any adequate cause, with those around him, and uses harsh words which the occasion does not justify: conduct, of which he can offer to himself no explanation, except that he cannot help it; and for which, if he be a right-minded person, he is sorry afterwards. If he were to yield to the impulse of his temper so far as to inflict on another a severe bodily injury, ought it to be admitted as an excuse, that Dr. Garrod had examined his blood, and found in it too large a proportion of lithic acid? Yet, when Oxford yielded to what was probably a less violent impulse, which caused him to endeavour to take away the life of the Queen, the jury acquitted him, on the ground of his being the subject of "Moral Insanity." It seems to me that juries have not unfrequently been misled by the refinements of medical witnesses, who, having adopted the theory of a purely moral insanity, have applied that term to cases to which the term insanity ought not to be applied at all. It is true, that the difference in the character of individuals may frequently be traced to difference in their organizations, and to different conditions as to bodily health; and that, therefore, one person has more, and another has less difficulty in controlling his temper, and regulating his conduct. But we have all our duties to perform, and one of the most important of these is, that we should strive against whatever evil tendency there may be in us arising out of our physical constitution. Even if we admit (which I do not admit in reality), that the impulse which led Oxford to the commission of his crime was at the time irresistible, still the question remains, whether, when the notion of it first haunted him, he might not have kept it under his control; and thus prevented himself from passing into that state of mind which was beyond his control afterwards. If I have been rightly informed, Oxford was himself of this opinion; as he said, when another attempt had been made to take away the life of the Queen, "that if he himself had been hanged this would not have happened." We have been told of a very eminent person who had acquired the habit of touching every post that he met with in his walks, so that at last it seemed to be a part of his nature to do so; and that if he found that he had inadvertently passed by a post without touching it, he would actually retrace his steps for the purpose. I knew a gentleman who was accustomed to mutter certain words to himself (and they were always the same words), even in the midst of company. He died at the age of ninety, and I believe that he had muttered these words for fifty or sixty years. These were foolish habits; but they might have been mischievous. To correct them at last would have been a very arduous undertaking. But might not this have been easily done in the beginning? and if so,—if instead of touching posts, or muttering unmeaning words, these individuals had been addicted to stealing or stabbing,—ought they to have been considered as absolved from all responsibility? It has been observed by a physician, who has had large opportunities of experience in these matters, that "a man may allow his imagination to dwell on an idea until it acquires an unhealthy ascendancy over his intellect."* And surely, if, under such circumstances, he were to commit a murder, he ought to be held as a murderer, and would have no more claim to be excused than a man who has voluntarily associated with thieves and murderers until he had lost all sense of right and wrong; and much less than one who has had the misfortune of being born and bred among such malefactors.

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* Anatomy of Suicide, by Forbes Winslow, M.D

Ergates. I have no doubt, as you have expressed it, that those who have maintained the doctrine of "Moral Insanity," have often applied that term to cases in which the name of Insanity ought not to have been applied at all. But I also have no doubt that there has been much mystification of the subject, by the application of the same term to other cases in which illusions really existed, and which might, therefore, have been more properly classed with cases of ordinary mental aberration. At the same time, we must not overlook the fact that there may be, and sometimes is, a real difficulty in determining whether a man who abandons himself to an evil passion, or a mischievous or absurd propensity, labours under illusions or not. For example: a disease has been described under the name of Bulimia, in which the patient is affected with an inordinate appetite, which nothing can satiate, and which his will is powerless to resist. One individual, whose case is recorded in the Transactions of the Royal Society, would eat an ordinary leg of veal at a single meal, adding to it a store of sow-thistles, and other wild vegetables.* Another would devour raw, and even living cats, rats, and dogs, the entrails of animals, and candles, to the extent of fourteen pounds daily.† Now, except that the passion has another object, there seems to be no essential difference between these cases and that of a man who squanders his property, purchasing articles for which he has no use, and which he immediately lays aside, reckless of the ruin which he is bringing on himself, his wife, and children. But it may be urged, on the other hand, that in Bulimia the sense of hunger, where food is not really required, and which nothing can allay, may not improperly be regarded as an illusion; having, at any rate, a considerable resemblance to the visions, voices, or unfounded conceits, which haunt the imagination of an ordinary lunatic.

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* Philosophical Transactions, vol. xxii.

† London Medical and Physical Journal.

Crites. There seems to be some truth in this comparison. But let us suppose that your patient, with Bulimia, were to be in the habit of robbing butchers' shops and larders, ought he to be considered as not being responsible for his actions, because he was driven to do so by his inordinate appetite? And this leads me to offer one farther observation. If we are not to confound merely mischievous propensities with illusions, we are also not to admit the mere existence of an illusion, as being in all cases an excuse for crime. A thorough-going Socialist may be conscientiously persuaded that the unequal distribution of property is contrary to religion and morality. The conviction may be so strong that he not only disregards, but cannot comprehend, the arguments which satisfy men of sober sense that his views are erroneous and absurd. Is this anything more or less than an illusion; and if, under its influence, he were to appropriate to himself his neighbour's property, or abet others in taking it for themselves, is he, therefore, to be held as not being responsible for what he does? it being always borne in mind that the object of human punishment is, not to revenge society on the malefactors, but to deter others from following their example. There are many dogs whose natural and original instinct leads them to run after and kill sheep; but a proper discipline teaches them that they are not to do so, and counteracts the instinct. There are, undoubtedly, instances without number of illusions, which not only have a firmer hold on the mind than the instinct of dogs, but which neither argument nor discipline can remove or even control: but it is not so as to others; and surely there is no reason why those of the latter class should not be overruled by means analogous to those which overrule the instinct of the brute. Dr. Mayo, whose attention has been directed, with much success, to this class of inquiries, has arrived at this conclusion, and I do not see how any one can well differ from the opinion which he has expressed.*

EUBULUS. Believing as I do, with Crites, that the subject which you are now discussing is one of great importance as it affects society at large, I have listened with much interest to the observations which you have made. You, Crites, have pointed out the necessity of not confounding, as has been sometimes done, mischievous or absurd propensities, however strong, with actual insanity. You, Ergates, have endeavoured to show that there is no broad line, by which the former can always be distinguished from the latter; and I am inclined to agree with both of you. But I also cannot but assent to the opinion of Crites, when he farther stated that the existence of illusions is not in every instance to be regarded as justifying the plea of want of responsibility. Allow me to add, that it is a very great mistake to suppose that this is a question which can be determined only by medical practitioners; any one of plain common sense, who will give it due consideration, is competent to form an opinion on it, and it belongs fully as much to those whose office it is to administer the law, as it does to the medical profession.

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* See Additional Note D.

THE FOURTH DIALOGUE.

Different Functions of the Brain and Spinal Chord.—Continuance of Life in some Animals without the Brain.—Automatic motions of Plants and of some of the lower Animals.—Multiplication of the latter by Division.—The Diplozoon Paradoxon.—Buffon's View of the Mode of Existence of the lower Animals.—A Nervous System not necessary to simple animal Life.—Origin of the nervous Force.—Influence of the Venous or dark-coloured Blood on the Functions of the Nervous System.—The Absence of Sensibility or voluntary Power no proof of the Absence of Consciousness.—Dr. Wollaston, &c.—State of Mind preceding Death.—Nature and Phenomena of Sleep.—Dreams the Result of the Imagination uncontrolled by the Will.—Rapidity of Dreams.—Their Character influenced by accidental physical Impressions.—Supposed Solutions of Problems, &c., during Sleep.—Müller's Observations on the Subject.—Do Dreams answer any Purpose in the Economy of living Beings?—Inquiries as to the Nature of the Changes which occur in the Nervous System in connection with Mental Operations.

The clear transparent atmosphere of the preceding day was followed, as might have been anticipated, by rain, which confined us to the house. In the afternoon we were assembled in Eubulus's library, and had been for some time conversing in a desultory manner, when the subject of our former discourse was thus resumed.

Crites. Ergates regards the brain, properly so called, as the physical organ by means of which alone (to use his own expression) the one indivisible percipient and thinking being, which each of us feels himself to be, maintains its communication with the external material world. But I own that he did not quite satisfy me that this opinion is correct, and I should be glad to make some farther inquiries on the subject. *A priori*, there is no reason why the mind should not be in connexion with any, and every, other part of the nervous system; why it should not be present in the eye, and at once, and without the intervention of any other organ, have a direct perception of the picture of external objects which is painted on the retina; or a similar perception of the impressions which the waves of sound make on the nerves in the labyrinth of the ear; or of those which we refer to the sense of touch in the hands or feet, or elsewhere on the surface of the body. Then, if I am not misinformed, the spinal chord in some of the lower animals of the vertebrate class is of considerably larger size than the brain itself. May we not, therefore, conclude that it is at least equal to the brain as to the importance of its functions? Again, mankind have, in all ages, referred hope and fear, joy and sorrow, love and hatred, to the heart. May they not have their special seat in the nerves of that organ? I have understood that a distinguished French physiologist has supposed what you anatomists call the great sympathetic nerve, (which I understand to be connected with, but nevertheless distinct from both the brain and the spinal chord) to be the actual seat of that class of mental conditions which we call the passions or emotions.

ERGATES. I agree with you in the opinion that, *à priori*, there is no reason why all this should not be as you have now suggested. The only question is as to the matter of fact. You may recollect that in the course of our conversation yesterday, I referred to two cases, in one of which pressure on the optic nerve, and in the other disease of the same nerve, occasioned total blindness; but in which nevertheless the individuals thus affected were haunted by illusions, believing that they saw objects which did not actually exist. So if the nerves be divided, or materially injured in the thigh the sense of touch is destroyed in the foot: while, if the leg be amputated, the patient for a long time afterwards feels his feet and toes as if they still belonged to him. The conclusion to be drawn from these facts is sufficiently obvious.

With regard to the spinal chord, it is true that it exercises functions of the greatest importance in the animal economy, generating the nervous energy, which is required for muscular action; influencing the secretions; in part regulating the motions of the heart; and probably helping to maintain the action of different organs in that sympathetic union, and harmony, which is necessary to the due performance of their several functions. The size of the spinal chord bears an exact proportion to what is required of it in those respects, while it has no relation whatever to the faculties of perception and thought. It is true that the spinal chord is composed of the same materials as the brain, in the form of the grey and vesicular, and the white or fibrous substance; but in the former these are disposed in the same simple form throughout, while in the latter, as indeed I explained formerly, there is an almost endless variety as to the mode in which they are arranged; and we recognise in it, not a simple and uniform organ, but a congeries of organs, each having a peculiar structure, and being evidently intended to answer a special and peculiar purpose. A large extravasation of blood within the head, by the pressure which it causes on the brain, induces a state in which there is a total insensibility to all external impressions, and at the same time an entire suspension of the influence of volition. But the effect of a similar injury of the spinal chord is widely different. The parts below the injury, the communication of which with the brain is thus interrupted, are deprived of their sensibility. The muscles are no longer subjected to the dominion of the will, although they may still contract on the application of mechanical stimuli or electricity. The lower limbs may be made to start by tickling the soles of the feet. But those motions are merely automatic, and we have no reason to believe that they are attended with sensation, or preceded by volition, any more than those of the leaves of the *Mimosa sensitiva.* At the same time, in those parts of the body which are above the injury, and whose nervous communication with the brain is not interrupted, the sensibility and power of voluntary motion are unimpaired, as are also the mental faculties. Singular indeed is the condition of the individual, in whom there has been a laceration, or equally severe injury of the spinal chord in that part of the neck which is immediately below the origin of the nerves belonging to the diaphragm. In him respiration, though imperfectly performed, continues, so that life may be maintained during a period which varies from twenty-four hours to five or six days. He retains his consciousness; he can see and hear, and comprehend what passes around him, but except his head, and the upper part of his neck, his body is as if it did not belong to him. He is a living head and nothing more. I saw a lady under these circumstances with her mind as active, her sympathy with others, and her sense of duty as perfect as before the injury had occurred. In fact the result which follows any severe injury of the spinal chord, though greater in extent, is of the same kind as that which follows the division of a nerve. Then as to Bichat's hypothesis of the passions or emotions having their seat in the great sympathetic nerve, we know that the heart palpitates with hope; that its action may cease under the influence of fear; that grief may cause tears to flow from the lachrymal gland; and that anxiety of mind may cause the mouth to be parched by stopping the secretion of saliva, and interfere with the digestion of the food by the stomach. But surely it would be a very far-fetched conclusion to assume from such facts as these that hope and fear reside in the cardiac plexus of nerves, or grief in the ophthalmic branch of the nerve of the fifth pair. Indeed, they show nothing but this, that as certain states of mind affect one class of muscles by means of volition, so other states of mind affect other muscles, or other organs, without the volition being exercised.

We must regard the animal appetites and instincts as being intimately connected with the nervous system, and as having their special places allotted to them in it. But we are not warranted in drawing the same conclusion as to the emotions and passions, properly so called. Hope and fear, joy and sorrow, pride and shame, these, and such as these, are conditions of the mind, which have no abstract or independent existence; but which as they may be superadded to our perceptions and thoughts, admit of being excited and acted on through the medium of the nervous system. At the same time, as far as we can see, they have no special locality in it.

Eubulus. But has it not been stated that there are some of the less perfect vertebrate animals, which actually survive decapitation, and live even for several months after being thus deprived of the brain? and is it not the case that some of the lower grade of animals admit of being divided into parts, and that each of these becomes a distinct individual, as if in them the mental principle resided in the animal generally, and were itself capable of division?

ERGATES. It is true that Le Gallois found that certain lizards lived for a very considerable time after the loss of the head; and that when they died at last the immediate cause of death appeared to be the want of food. But creatures under such circumstances exhibit no sign of anything more than automatic life. Even breathing is suspended, the blood probably deriving the little oxygen which is required, not from air drawn into the lungs, but from being exposed to the atmosphere in the superficial vessels of the skin. It is also true that if the legs be pinched under these circumstances the muscles are made to contract; but this is no more a proof of sensibility than the starting of the limbs, which I have already mentioned as occurring in the human being on tickling the soles of the feet after an injury of the spinal chord; or the convulsions of an epileptic patient. Then as to the multiplication of some of the lower orders of animals by division, we know so little of their mode of existence, and it is so entirely different from that of animals of the higher orders, that it really seems to me that we can draw from it no conclusion that would be well applicable to the latter. Is it at all certain that a polypus is endowed with any higher properties than those which belong to vegetable life? Do the motions of its filaments afford any better evidence of sensibility and volition, than those exhibited by many plants, such as the *Mimosa sensitiva*, the *Dionæa muscipula*, or the *Hedysarum gyrans*? or than the folding up of many flowers in the night and in rainy weather? or than the motions of the minute bodies described under the name of cilia in animals? or, if the sensibility of the polypus be taken for granted, may it not be a compound animal with distinct centres of sensation and volition, in like manner as in a tree every bud is in fact a distinct individual, which may live and grow though separated from the parent stock? An example of this mode of existence is supplied by an animal much above the polypus in the scale of living beings. The *diplozoon paradoxon* is described by Nordmann as a parasitic animal which attaches itself to the gills of the *Cyprinus Brama.* It consists in fact of two animals, united in the centre so that they have a part of their viscera in common, but with two distinct nervous systems. As far as the latter are concerned there is no reason why each half of this double creature should not live very well, though separated from the other.*

It is true that one of our most celebrated modern physiologists, from observing the multiplication of polypi by the mere division of the animal, and from some other circumstances, has come to the conclusion which you have suggested, that the mental principle, which to our conceptions presents itself as being so preeminently, above all other things in nature, one and indivisible, is nevertheless itself divisible, not less than the corporeal fabric with which it is associated. But it is to be observed that, great as is the authority of Müller generally in questions of physiology, in the present instance he is not quite an unprejudiced witness, inclined as he is to the pantheistic theory, which has descended from the school of Pythagoras to these latter times, as it had before been derived by him from the Buddhists of the East; and which teaches that all the innumerable variety of living beings which we see around us, are but different manifestations, and as it were emanations, of the one vast intelligent spirit which pervading the universe

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* Annales des Sciences Naturelles, vol. xxx. 1833.

> "Agitat molem et magnô se corpore miscet."

Eubulus. If my recollection be accurate, Buffon regards the condition of some of the lower animals, taking the oyster as an example, as being that of constant and profound sleep, meaning thereby that they have neither sensation nor volition.

Ergates. However that may be, there is no doubt that mere animal life may exist without either the one or the other, or without anything that bears even the most remote relation to the mental principle. For instance, Dr. John Clarke has given an account of "an extraordinary product of human generation," in which there was "neither brain, spinal marrow, nor nerves, nor heart, nor lungs," but which was nevertheless a living organised mass, containing several bones tolerably well formed, and vestiges of some other organs.*

As I have already mentioned, the nervous system is composed of two substances of different organization; the one, which is commonly called the medullary, being of a white colour, of a soft consistence, which may be proved by a careful dissection to be composed of fibres; the other of vesicular or cellular structure, of a still softer consistence, more largely supplied with blood-vessels, presenting no fibrous appearance, and of a grey colour. This grey matter exists in much smaller quantity than the medullary, being disposed in layers in which the fibres of the latter seem to have their origin. It is generally supposed that the function of the medullary substance is to conduct, direct, and make use of the nervous force, the latter being generated in the grey substance, and being in itself always one and the same, though converted to different purposes in different parts; much as the electricity generated in a voltaic battery is made by means of one apparatus to produce chemical decomposition, and by means of others to direct the needles of a telegraph, or convert common iron into a magnet. We may carry the parallel between the nervous and the electric force further still. Although the grey matter of the nervous system is necessary for the production of the former, it is not in itself sufficient, any more than the alternate plates of zinc and copper are sufficient for the production of the latter. The acid solution added to the Voltaic battery is required in the one case, the presence of blood which has obtained a scarlet colour and undergone other changes by exposure to the air in the lungs, is necessary in the other. In some animals of the cold-blooded classes the sensibility as to external impressions, and the power of voluntary movement, may indeed remain after the supply of scarlet blood has ceased, but it is only for a limited period of time; while in man and in other warm-blooded animals the suspension of the same faculties, under the same circumstances, seems to be, not absolutely, but almost, instantaneous. In a person who is drowned, or otherwise suffocated, and in whom the dark-coloured blood is transmitted to the brain by the action of the heart, two or three minutes are sufficient to produce the effect which has been described. This has been fully explained by Bichat, whose observations on the subject I had occasion to mention formerly. If you wish to obtain further information on it, and will refer to the "*Récherches sur la vie et la mort*," you will be well rewarded for your labour.

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* Philos. Transactions, 1793, p. 154.

Eubulus. Under this view of the subject, the dark-coloured blood affects the brain simply by a negative influence; by depriving it of that, whatever it may be, which exists in the scarlet blood, but not in the dark-coloured blood, and which is necessary to the generation of the nervous force. But, if this were all, the brain ought to resume its functions immediately on the supply of scarlet blood being restored. Is it so in reality? I have heard of drowned persons who remained insensible for a long time after they were taken out of the water, although they recovered ultimately.

Ergates. Your observation is quite correct. In fainting, or, as we technically term it, in syncope, the supply of blood to the brain is interrupted altogether; both of that which is scarlet, and of that which is dark-coloured; and if the syncope be complete, there is a state of apparent insensibility, from which, however, when the action of the heart is restored, the patient presently recovers. But the dark-coloured blood, if it has once been transmitted to the brain even for two or three minutes, leaves an impression on it, from which it may not recover for half an hour or even longer. After strangulation, especially, individuals have sometimes remained in a state of apparent insensibility for some hours. In fact the dark-coloured blood transmitted to the brain operates as a narcotic poison. I need scarcely remind you that there are very many foreign substances, as for example alcohol, chloroform, opium, the woorara, which introduced into the circulation produce the same effect, even though the supply of scarlet blood is not interrupted. Of the *modus operandi* of such terrible agents we are wholly ignorant. All that we know is the simple fact, that when their operation is complete they render the brain insensible to the impressions made on the external senses, and incapable of transmitting the influence of volition to the muscles. Pressure on the brain or a stroke of lightning may produce the same effect.

EUBULUS. In short, a condition of the brain producing unconsciousness may be produced in various ways.

ERGATES. I have purposely avoided using the word unconsciousness, for as to that it is plain that we know nothing. The mind may be in operation, although the suspension of the sensibility of the nervous system, and of the influence of volition over the muscles, destroys its connection with the external world, and prevents all communication with the minds of others. It is indeed difficult to say even when the external senses are completely and absolutely closed. I might refer to numerous facts which have fallen under my observation as illustrating this subject; but the following will be sufficient. An elderly lady had a stroke of apoplexy: she lay motionless, and in what is called a state of stupor, and no one doubted that she was dying. But after the lapse of three or four days, there were signs of amendment, and she ultimately recovered. After her recovery she explained that she did not believe that she had been unconscious, or even insensible, during any part of the attack. She knew her situation, and heard much of what was said by those around her. Especially she recollected observations intimating that she would very soon be no more, but that at the same time she had felt satisfied that she would recover; that she had no power of expressing what she felt, but that nevertheless her feelings, instead of being painful or in any way distressing, had been agreeable rather than otherwise. She described them as very peculiar; as if she were constantly mounting upwards, and as something very different from what she had ever before experienced. Another lady who had met with a severe injury of the head, which caused her to be for some days in a state of insensibility, described herself as having been in the enjoyment of some beatific visions, at the same time that she had no knowledge of what had actually happened, or of what was passing around her. I have been curious to watch the state of dying persons in this respect, and I am satisfied that, where an ordinary observer would not for an instant doubt that the individual is in a state of complete stupor, the mind is often active even at the very moment of death. A friend of mine who had been for many years the excellent chaplain of a large hospital, informed me that his still larger experience had led him to the same conclusion. A remarkable example of this occurred in the case of the late Dr. Wollaston. His death was occasioned by a tumour of the brain, which, after having attained a certain size, encroached on the cavities (or as they are technically termed the ventricles) of the brain, and caused an effusion of fluid into them, producing paralysis of one side of the body; and it is worthy of notice that certain symptoms which he had himself noted, and as to the cause of which he had been in the habit of speculating, proved that this organic disease must have existed from a very early period of his life. During his last illness his mental faculties were perfect, so that he dictated an account of some scientific observations which would have been lost to the world otherwise. Some time before his life was finally extinguished he was seen pale, as if there were scarcely any circulation of blood going on, motionless, and to all appearance in a state of complete insensibility. Being in this condition, his friends who were watching around him observed some motions of the hand, which was not affected by the paralysis. After some time it occurred to them that he wished to have a pencil and paper, and these having been supplied, he contrived to write some figures in arithmetical progression, which, however imperfectly scrawled, were yet sufficiently legible. It was supposed that he had overheard some remarks respecting the state in which he was, and that his object was to show that he preserved his sensibility and consciousness. Something like this occurred some hours afterwards, and immediately before he died, but the scrawl of these last moments could not be decyphered.*

Eubulus. You might refer as confirming the observations which you have just made to that interesting letter of Sir Francis Beaufort (which some of us had seen long ago in manuscript, and which is now generally known, having been published by the late Sir John Barrow in his Autobiography), in which the writer describes what happened to himself when he was preserved from being drowned; when "every incident of his former life seemed to glance across his recollection in a retrograde succession, not in mere outline, but the picture being filled with every minute and collateral feature," forming "a kind of panoramic view of his entire existence, each act of it accompanied by a sense of right and wrong."† &c.

Ergates. I have been informed of some other cases in which the same thing happened, and all this must have been in the brief space of a very minutes. But I have also been informed of other instances of individuals whose minds had been affected very much in the same way when they were suddenly placed in a situation which threatened immediate death, although they were not at all deprived of their sensibility and self-possession. It is probable that histories such as these suggested that rather curious tale of the Chec Chehabeddin and the Infidel Sultan of Egypt, which used to astonish my youthful imagination, in reading the Persian and Turkish tales. The accounts, however, given after recovery from drowning vary very much. Some, whatever they may have felt at the time, remember nothing except their having been overcome by a sense of insuperable drowsiness. In one instance, as a naval officer informed me, a sailor who had been snatched from the waves, after lying for some time insensible on the deck of the vessel, proclaimed on his recovery that he had been in Heaven, and complained bitterly of his being restored to life as a great hardship. The man had been regarded as a worthless fellow; but from the time of the accident having occurred, his moral character was altered, and he became one of the best conducted sailors in the ship.

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* See Additional Note E.

† Autobiographical Memoir of Sir John Barrow, Bart., p. 398.

EUBULUS. We may conclude from what you now have stated, that drowning, terrible as it appears to be, is not after all, either morally or physically, a painful death; and this is confirmed by the experience of a friend of my own, who very nearly lost his life in this manner. He says that the last thing which he remembers is looking at the pebbles and weeds at the bottom of the river, with little or no fear of what was about to happen, and no bodily suffering. I suppose that it is the same whenever death takes place in the same manner: in cases of strangulation, for example.

ERGATES. Really, according to my observation, the mere act of dying is seldom in any sense of the word a very painful process. It is true that some persons die in a state of bodily torture, as in cases of tetanus; that the drunkard, dying of *delirium tremens*, is haunted by terrific visions; and that the victim of that most horrible of all diseases, hydrophobia, in addition to those peculiar bodily sufferings from which the disease has derived its name, may be in a state of terror from the supposed presence of frightful objects, which are presented to him as realities, even to the last. But these and some other instances which I might adduce are exceptions to the general rule, which is, that both mental and bodily suffering terminate long before the scene is finally closed. Then as to the actual fear of death: it seems to me that the Author of our existence, for the most part, gives it to us when it is intended that we should live, and takes it away from us when it is intended that we should die. Those who have been long tormented by bodily pain are generally as anxious to die as they ever were to live. So it often is with those whose life has been protracted to an extreme old age, beyond the usual period of mortality, even when they labour under no actual disease. It is not very common for any one to die merely of old age:—

"Like ripe fruit to drop
Into his mother's lap."

But I have known this to happen; and a happy conclusion it has seemed to be of worldly cares and joys. It was like falling to sleep, never to awake again in this state of existence. Some die retaining all their faculties, and quite aware that their dissolution is at hand. Others offer no signs of recognition of external objects, so that it is impossible for us to form any positive opinion whether they do or do not retain their sensibility; and others, again, as I have already stated, who appear to be insensible and unconscious, when carefully watched, are found not to be so in reality; but they die contentedly. I have myself never known but two instances in which, in the act of dying, there were manifest indications of the fear of death. The individuals to whom I allude were unexpectedly destroyed by hæmorrhage, which, from peculiar circumstances, which I need not now explain, it was impossible to suppress. The depressing effects which the gradual loss of blood produced on their corporeal system seemed to influence their minds, and they died earnestly imploring that relief which art was unable to afford. Seneca might have chosen an easier death than that from opening his arteries.

EUBULUS. In the account which you have now given us, it seems to me that you have made a considerable omission, in as much as you have said nothing as to the influence of religious sentiments on the minds of dying persons; of the hopes and fears connected with the retrospect of a well-spent or ill-spent life, and with the prospect of what is to happen after the greatest and most mysterious change belonging to humanity has taken place.

ERGATES. You have called our attention to a subject involving considerations to which no one can be indifferent. But you do me an injustice, if you suppose that I have been unmindful of it. What I have said refers only to the last stage in the process of dissolution. There is no doubt that a pure and simple religious faith, and a firm reliance on the Being who has placed us here, contribute more than anything besides to disarm death of its terrors, deprive "the grave of its victory," and smooth the passage of the humble and sincere believer to the termination of his worldly career. Nevertheless, according to my own experience, and what I have heard from others, the influence of religious feelings is, for the most part, not so much perceptible at the moment when death is actually impending, as it is at an earlier period, when the individual, who was previously in health, or supposed himself to be so, first discovers that it is probable that he will die.

Crites. You have compared death from mere old age to falling asleep never to awaken again in this world. This brings us to another subject, not very distantly related to that which we have been just discussing; at least so thought the Latin poet, when he wrote—

> "Quid est somnus, gelidæ nisi mortis imago?"

What is sleep itself? Wherefore is it required? What is the condition of the nervous system on which it immediately depends? and what, during sleep, is the actual condition of the physical and mental faculties?

Ergates. One of your questions certainly cannot be answered. It is plain that in some respects the condition of the nervous system must be different during sleep from what it is when we are awake; but it seems impossible that we should know in what that difference consists, when we consider that neither our unassisted vision, nor the microscope, nor chemical analysis, nor any analogy, nor any other means at our disposal, enable us to form any kind of notion as to the actual changes in the brain or spinal chord on which any other nervous phenomena depend. Then, as to the other points to which you have adverted, the subject has been so frequently treated of by others, that there is little or nothing new to remark upon it.

It appears that in human beings, and in all animals of the higher classes, those functions, which Bichat has described as constituting the system of organic life, may continue to be performed without the need of repose; but that it is quite otherwise with regard to those which the same physiologist has referred to animal life, and which are connected with the mental principle. It is for the latter, and not for the former, that sleep is required. As Eubulus observed on a former occasion, the action of the heart, and of the muscles of respiration, the digestion of the food, the various secretions, the generation of animal heat, all these functions are performed during sleep, as well as when we are awake; and so far, the sleep of human beings differs very much from the torpor of hybernating animals, in whom, during the winter, these functions are reduced to the very lowest degree of activity. But, if we extend our inquiries to the functions of animal life, we find, that if we act with the voluntary muscles, if we think, and even if we merely attend to the sensations, which are derived through the organs of sense, or to those which arise spontaneously in our minds, after a time what we call a sense of weariness arises, and we require repose; and it is this repose which sleep affords us. It would appear that during sleep there is an accumulation of the nervous force, which is brought into use, and gradually exhausted after sleep is terminated; the expenditure of it being greater, and the exhaustion more complete in proportion to the degree in which the volition is exercised. The muscles of the limbs may be for a long time in a state of involuntary contraction (as in cases of tetanus or catalepsy) without weariness being induced; but under the influence of the will they cannot remain contracted for more than a few minutes at a time. In like manner, visions may pass before the mind when it is entirely passive, without causing fatigue; but it is quite otherwise when we endeavour to arrest their progress, to view them under different aspects, and to compare them with each other. This occasions weariness, and makes us stand in need of repose, and at intervals of that complete repose which belongs to sleep, as much as voluntary muscular exertion; and these things justify the opinion, which I believe was first distinctly expressed by Dr. Darwin, that the essential part of sleep is the suspension of volition.

Crites. But some objections may be made to this explanation. We see persons turn round in their sleep, and hear them talk in their sleep, which must be regarded as a proof that their volition is exercised. Besides we breathe in our sleep, and is not this a voluntary process?

ERGATES. Such objections are easily answered. There are, in fact, degrees of sleep. It may be so incomplete that the individual may be moving and awaking at intervals during the whole night. As to breathing, I apprehend that no one who is at the pains to consider the subject can doubt that, although to a certain extent it may be influenced by the will, it is, under ordinary circumstances, as independent of it as the action of the heart, or the peristaltic motion of the intestines. We may by a powerful effort suspend the action of the respiratory muscles during a limited time. It is said that the divers for pearls can do this for a minute, or even longer. At last, however, the will is powerless, and we breathe in spite of it. Again, you may say that a sound or touch, which would be heard or felt by a waking person, may not affect us at all when we are asleep; and that this shows that there is something more than the mere absence of volition. But observe, at all times, what a multitude of impressions are made on our senses, of which we take no cognisance. I am engaged in writing a letter, or in reading a book in which I am much interested; a friend comes into the room, opens and shuts the door, or he may even speak to me in his ordinary tone of voice, and I know nothing of it. It is obvious, that unless our attention be directed to them, the impressions on our senses are not communicated to the mind; and such an effort of attention implies an effort of volition? But my friend speaks to me in a louder tone, which rouses my attention; and then I hear all that he says in his ordinary voice afterwards. So it is during sleep. Those smaller sounds which we hear distinctly when we lie awake, in the stillness of the night, are during sleep unnoticed. So is the light from the rushlight. But a tempest of wind, or the morning sun pouring in his rays through the window, rouse our attention, and with this effort of attention sleep is terminated.

I may here refer to the state of mind during what is popularly termed " the nightmare," as illustrating this subject. In this case sleep is imperfect. We are to a certain extent aware of our situation. We know where we are, but we feel as if some power oppressed us, and prevented our moving our limbs. The fact is, not that the muscles will not obey the will, but that the will itself is not exercised. The paralysis and catalepsy of hysterical patients is of the same kind, and both the one and the other immediately vanish if a strong impression be made on the senses, or even on the imagination.

Sound sleep is incompatible with voluntary exertion, mental or bodily. After long watchfulness, or severe labour, we sleep in spite of ourselves, because the power of exercising the volition is exhausted. If we would sleep under other circumstances, the first thing that we do is to abstain from exercising it. We place ourselves in that position, in which we can remain without calling into action any of our voluntary muscles; we close our eyes that we may not be tempted to attend to visible objects; we exclude from our minds all disagreeable or otherwise exciting subjects to which our attention might be too earnestly directed; we cause a child to sleep by rocking him in his cradle. The so-called mesmeric passes may produce the same effect. When I do not easily fall asleep at night, I frequently succeed in obtaining sleep by watching the strange, indescribable, and ever varying spectra, which I refer to the eye, though they are probably in the brain itself, and which present themselves when real objects are excluded from the sight. It is not that on such occasions as those to which I have referred, there is absolutely no effort of attention, but the effort is so slight that it is next to none at all, and readily ceases of itself, at the same time that it prevents the greater effort which I should be led to make if things of higher interest were to occupy the mind.

There are physical causes within ourselves, and independent of all external circumstances, which interfere with sleep,—bodily pain, for example, or acid in the stomach. It may be said that actual pain, and the disagreeable sensations produced by indigestion, prevent sleep, as a strong light might prevent it, by too powerfully exciting the attention. At the same time, there is no doubt that there is sometimes a morbid condition of the nervous system, the nature of which we cannot well explain, which is incompatible with sleep. The patient says, "I feel fatigued and wearied, and that I want to sleep, but I cannot sleep."

EUBULUS. I have understood that this state of the system, when long continued, is sometimes the forerunner of mental derangement; and I can well understand it to be so. It is reasonable to suppose that the absence of its natural refreshment would powerfully affect the nervous system. Indeed, it happened to myself to be acquainted with a case of this kind. A gentleman of my acquaintance, in whose family circumstances had occurred which were to him a source of intense anxiety, passed six entire days and nights without sleep. At the end of this time he became affected with illusions of such a nature that it was necessary to place him in confinement. After some time he recovered perfectly. He had never shown any signs of mental derangement before, nor had any one of his family, and he has never since been similarly affected. This was an extreme case. But do not examples of the want of sleep producing very similar results, though in a very much less degree, occur under our observation constantly? How altered is the state of mind in any one of us after even two sleepless nights! Many a person, who, under ordinary circumstances, is cheerful and unsuspicious, becomes not only irritable and peevish, but also labours under actual though transitory illusions; such, for example, as thinking that others neglect him, or affront him, who have not the smallest intention of doing either the one or the other.

ERGATES. I have observed such effects as these repeatedly in nurses who have been harassed by an incessant attendance on sick persons during many successive days and nights;

and this goes far towards explaining the origin of a vice to which individuals of this class too frequently become addicted. Alcohol removes the uneasy feeling, and the inability of exertion, which the want of sleep occasions. I have sometimes, when I have been writing late at night, and much fatigued, so that I could scarcely fix my attention on the thing before me, feeling as if my head were almost too large for the room to contain it, obtained complete relief by taking a single glass of wine. But such relief is only temporary. Stimulants do not create nervous power; they merely enable you, as it were, to use up that which is left, and then they leave you more in need of rest than you were before. The same observation applies to powerful mental excitement, with this difference, however, that it enables you to overcome the sense of exhaustion more completely, at the same time that it has a less transient operation than any merely physical stimulus.

CRITES. The observations which you have now offered relate chiefly to our physical condition during sleep. But the state of the mind during sleep is to us, who are not physiologists, a question of even greater interest than this. Eubulus made some remarks on this subject on a former occasion. Perhaps he can give us some further insight into it.

Eubulus. Indeed, it is difficult for me to say anything without the risk of repeating what I have incidentally said already. Besides, I have no knowledge of the subject beyond that which is within the reach of any other person with common powers of observation.

During what may be called sound sleep, those impressions on the external senses, of which we take cognisance while we are awake, are altogether unnoticed. But it is not so with regard to those changes which are taking place in the brain itself; and that which constitutes the imagination during the day is the foundation of our dreams at night. There is, however, a great difference in the two cases to which I adverted formerly. The imagination while we are awake is regulated by the will. We can arrest its visions as they pass before us, compare them with each other, and dismiss them as we please. But it is not so with our dreams at night. Here the visions which arise, uninfluenced by the will, succeed each other according to no rule with which we are acquainted, forming strange combinations, often wholly unlike anything that really occurs; and not less differing from reality in the rapidity with which they come and depart. You are called in the morning, and fall asleep again. Perhaps, you have slept only three or four minutes, but you have had a long dream. The late Lord Holland was accustomed to relate the following anecdote of what had happened to himself. On an occasion, when he was much fatigued, while listening to a friend who was reading aloud, he fell asleep, and had a dream, the particulars of which it would have occupied him a quarter of an hour or longer to express in writing. After he awoke, he found that he remembered the beginning of one sentence, while he actually heard the latter part of the sentence immediately following it, so that probably the whole time during which he had slept did not occupy more than a few seconds. I mention this, however, only in the way of illustration, not as any very singular occurrence, for many facts of the same kind are on record, and, if we look for them, may be found within the range of our individual experience. If we were to pursue this subject it would lead us to some curious speculation as to our estimate of time, and the difference between the real and the apparent duration of life. The measure of time which we make by our own feelings is a very different matter from that which uncivilised man makes by the moon and stars, and which we now make by clocks and almanacks. The apparent duration of time is longer or shorter in proportion as a greater or smaller number of different states of mind follow each other in succession. To a child, whose imagination is constantly excited by new objects, and whose temper passes more easily from one passion to another, a year is a much longer period of time than to the grown-up man. As we advance in age so do the years pass more rapidly. We may suppose the life of the vivacious butterfly, which exists only for a single season, to be apparently longer than that of the slowly moving tortoise, whose existence is prolonged for one or two centuries; and that there is a similar difference, though in a less degree, between the life of the enterprising man, whose progress is crowded with events, and with alternate hopes and fears, and that of another, who, with more limited desires, keeps "the even tenour of his way."

During sleep ordinary impressions pass unnoticed. But impressions of a stronger kind rouse the attention, and in so doing put an end to sleep; while those of an intermediate kind affect us in another way, by giving a peculiar character to our dreams. Ergates made the same remark in one of our former conversations, referring to acid in the stomach, and some other cases, as illustrating the subject. It occurs to me to add another example to those which he has adduced. It lately happened to myself to dream that some one had given me a shell-fish in a shell something like that of a muscle; that I ate it, and that after it had been swallowed, I felt it to be very acrid, and that it produced a pain in my throat. When I awoke I found that I laboured under a sore throat, which must have suggested the dream. It is a curious fact that we may have a long dream in the act of awaking from our sleep. A military officer informed me, that while serving in the Peninsular war he had frequently been roused from his sleep by the firing of a cannon near his tent, and that he had a dream, including a series of events, which might be distinctly traced to the impression made on his senses by the explosion. Facts of this kind have inclined Lord Brougham to the opinion that we never dream except while in the state of transition from being asleep to being awake. But I own that this seems to me to be a mistake. First, there is no sufficient proof of it being so; and secondly, we have a proof of the contrary in the fact that nothing is more common than for persons to moan, and even talk in their sleep without awaking from it. Even in the case of a dog, who is sleeping on the rug before the fire, if you watch him, you can scarcely doubt that he is sometimes dreaming, though he still remains asleep. I should myself be more inclined to doubt whether we ever sleep without some degree of dreaming. At any rate, not to dream seems to be, not the rule, but the exception to the rule: for it rarely happens that we awake without being sensible of some time having elapsed since we fell asleep; which is in itself a proof that the mind has not been wholly unoccupied. That on such occasions we have no distinct recollection of our dreams proves nothing. Referring again to the instance of persons who talk in their sleep, we often find that they have not the smallest recollection of their having dreamed afterwards. It is only those dreams which affect us very strongly, and which occur immediately before we awake from sleep, that we really remember; and even of these the impression is not in general sufficient for us to retain it for more than a very few minutes. If a dream be remembered longer, it is only because we have thought of it after it occurred, and have thus given it a place in our memory which it could not have obtained otherwise. And this leads me to observe that, although memory does so little as to dreams, dreams throw some light on this wondrous faculty. I know not indeed what has happened to others, but it certainly has often happened to myself to dream of something that had occurred in my boyish days, and of which, as it had not been present to my thoughts for many years, it might well be supposed that it was wholly forgotten. On one occasion, I imagined that I was a boy again, and that I was repeating to another boy a tale with which I had been familiar at that period of my life, though I had never read it, nor thought of it since. I awoke, and repeated it to myself at the time, as I believe accurately enough, but on the following day I had forgotten it again. We may conclude from this and from some other analogous facts, that many things which seem to be erased from our memory are not erased from it in reality; that the impression remains, and that if we are not conscious of it, it is merely because the secret spring has not been touched, which would bring it again under our observation.

CRITES. What you have now mentioned shows that, however capricious and irregular during sleep the imagination may be, there are exceptions to the general rule. I have heard of mathematicians who have solved problems, and of others who have composed poetry in their sleep. An acquaintance of mine, a solicitor, was perplexed as to the legal management of a case which concerned one of his clients. In a dream he imagined a method of proceeding which had not occurred to him when he was awake, and which he afterwards adopted with success.

EUBULUS. It seems to me that facts of this kind are easily explained. There are, as Ergates has observed, degrees of sleep, and in a dream which occurs between sleeping and waking, the power of attention may be exercised, though not to the same extent as when we are completely awake. Besides this, however, it would indeed be a strange thing, in the crowded chapter of accidents, if among the vast number of combinations which constitute our dreams there were not every now and then some having the semblance of reality. However, I suspect that in such instances as that which you have mentioned there is often much of either mistake or exaggeration; and that if the problem or the poetry could be written down at the time, it would be found to be worth little or nothing. Knowing how imaginative a person Coleridge at all times was I may, I hope, be excused for saying that it is more easy to believe that he imagined himself to have composed his poem of Kuhla Khan in his sleep, than that he did so in reality. I may here refer to the experience of a distinguished physiologist on this subject. "Sometimes," says Müller, "we reason more or less accurately in our dreams. We reflect on problems, and rejoice in their solution. But on awaking from such dreams the seeming reasoning is found to be no reasoning at all, and the solution over which we had rejoiced to be mere nonsense. Sometimes we dream that another proposes an enigma, that we cannot solve it, and that others are equally incapable of doing so, but that the person who proposed it himself gives the explanation. We are astonished at the solution, which we had so long endeavoured to find. If we do not immediately awake, and afterwards reflect on this proposition of an enigma in our dream, and on its apparent solution, we think it wonderful; but if we awake immediately after the dream, and are able to compare the answer with the question, we find that it was mere nonsense. I have at least several times observed this in my own case." *

ERGATES. Still, without referring to such exercises of the intellect as Müller has described in the passage which you have now quoted, it must be owned that there is often a remarkable degree of coherence in our dreams. A drama is performed, including a series of events in which we ourselves are concerned, and having a mutual relation to each other. There are other actors in it, who seem to speak

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* Müller's Physiology, translated by Baly, p. 1417.

and act independently of ourselves, as if influenced by other motives, and aiming at other objects, with regard to which we do not concur, or to which we may be actually opposed. Scenes are presented to us, in which it seems that an intelligence is exercised, although we do not understand how that intelligence can be our own. How is it that these things happen? I own that I search in vain for any very satisfactory explanation.

EUBULUS. Another question arises as to dreams, which it is even more difficult to answer than that which you have suggested. Are they merely incidental effects of the existing order of things, as determined by the will of the Creator of the universe, or do they answer any special purpose, and lead to any ulterior consequences? In a machine of human invention effects arise which are truly incidental, that is, which were never contemplated or intended by the inventor. For instance, it was casually discovered that an abundance of electricity may be obtained from the steam supplied by the boiler of a steam-engine. But such a result had never been anticipated by those to whom we are indebted for this great invention. Does anything like this happen with regard to the machinery of the universe? Is it not more probable that everything that occurs has been anticipated, and has its definite and appointed purpose? I believe that no one has hitherto offered any certain or satisfactory explanation of the uses of the spleen, and that it is known that animals may live, and apparently in good health, after that organ has been removed. So, also, no satisfactory explanation has yet been offered of the functions of the thyroid gland or the renal capsules. Yet no one believes the formation of these organs to be merely incidental, or doubts that they have some special offices allotted to them. Dreams are, at any rate, an exercise of the imagination. We may well conceive that one effect of them may be to increase the activity of that faculty during our waking hours; and it would be presumptuous to deny that they may not answer some purpose beyond this in the economy of percipient and thinking beings.

Crites. Before our conversation for this day is concluded, there is one other inquiry which I would make of Ergates. Believing, as I do, that the percipient, conscious, and intelligent mind belongs to a mode of existence wholly different from that of the senseless bodies by which we are surrounded, still I cannot but admit that there must be certain changes taking place in the nervous system in connection with mental processes, some of these being transient in their nature, while others are so far permanent that they may not be effaced during the longest life. Now, with regard to these changes, Ergates has stated that "their exact nature is a mystery which we have no means of unravelling, and that this is a kind of knowledge as much beyond our reach as that of the structure of the sun, or of the central parts of the earth." Not disputing the correctness of this statement, yet I see no reason why we might not be able to form some general notion on the subject, and the following questions naturally present themselves to us. Are the changes which the nervous system undergoes simply mechanical? or are they of the same kind as those chemical changes which take place in inorganic matter? or do they rather belong to that class of phenomena which we refer to imponderable agents, such as electricity and magnetism, by virtue of which a piece of sealing-wax rubbed with a silk handkerchief draws light bodies to itself, or a bar of iron becomes endued with the attractive property of a magnet.

ERGATES. Although these subjects have not been hitherto formally discussed, still you may on some points anticipate my answer from observations which I have already made incidentally.

The very little that we actually know may be comprised in a few words.

1. The transmission of impressions from one part of the nervous system to another, or from the nervous system to the muscular and glandular structures, has a nearer resemblance to the effects produced by the imponderable agents to which you have alluded than to anything else. It seems very probable indeed,

that the nervous force is some modification of that force, which produces the phenomena of electricity and magnetism; and you may recollect that I have already ventured to compare the generation of it by the action of the oxygenised blood on the grey substance of the brain and spinal chord, to the production of the electric force by the action of the acid solution on the metallic plates in the cells of a voltaic battery.

2. We know that the solid parts of the body are in a state of perpetual change. There is a constant influx of new materials supplied by the digestive organs, and in other ways; and a corresponding efflux of the old materials by means of the various excretions, especially by that of the kidneys. The brain itself forms no exception to the general rule. We cannot otherwise account for its growth in the early part of life, nor for the alterations in its structure which arise as the consequence of disease, nor for those other changes which occur in extreme old age. The molecules of the brain in a man of twenty years of age are not the

same with those which formed the brain of the same individual when he was ten years old, nor with those of which it will be composed when he arrives at the age of fifty years. The mind preserves its identity, but there is no corresponding identity of the corporeal organ with which it is associated; and we may even venture to assert that the brain of to-day is not precisely and in all respects the same with the brain of yesterday, and that it will not be the brain of to-morrow.

3. We cannot suppose that such deposition of new materials and abstraction of old ones can be effected by mere mechanical means, as you would take one brick from a building and substitute another in its place. The elements of which the nervous system is composed exist in the blood, but they must undergo a new chemical combination before they can be incorporated with it; and in like manner they must undergo a chemical change of an opposite kind before they can re-enter the current of the circulation. The precise character of these chemical changes we have no means of ascer-

taining, but whatever it may be, there is reason to believe that in proportion as the nervous system is more or less exercised, whether it be in connection with mere corporeal functions, or with mental processes, so do they take place to a greater or less extent. As relating to this subject it may be observed that the nervous substance is distinguished from all the other tissues (with the exception of the bones) by the very large proportion of phosphorus which enters into its composition, amounting to 1·5 parts in 100, and to as much as one-thirteenth of the solid matter which remains after the evaporation of the water; and that one result of over-exercise of the nervous system is the elimination of an unusual quantity of salts containing phosphorus by means of the secretion of the kidneys. This fact was first observed by Dr. Prout, who has given it as his opinion "that the phosphorus in organised beings is in some measure connected with nervous tissues and nervous action," and who in another place refers to "severe and protracted debilitating passions, and excessive fatigue, as the general exciting causes of" what he terms "the phosphatic diathesis."*

4. With regard to those more permanent changes in the brain to which Crites has referred as connected with the memory, and what is called the association of ideas, and I may add, with mental habits and dispositions as far as these are dependent on our physical organization, I have nothing to offer beyond what I have expressed already. There is, I apprehend, sufficient evidence that such changes do certainly take place, but as to their real nature we not only know nothing, but have no means of obtaining any actual knowledge. The improved microscope of the present day has enabled us to unravel to a considerable extent the minuter tissues of the animal body; but nevertheless, in pursuing an inquiry such as this, it affords us no assistance. There can be no doubt that there is as much in the animal structures beyond the reach of the microscope, as there is in the vast universe around us

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* On the Stomach and Renal Diseases, third edition, pages 284—286.

beyond the reach of the telescope; so that, whatever we might thus discover, we may be sure that there is something further still. But let us suppose that it were otherwise, and (assuming the molecular hypothesis to be true) that with more perfect organs of sense, or more perfect instruments, we could trace exactly the changes which take place in the arrangement or aggregation of the ultimate molecules of the brain, I do not see that we should be much advanced in knowledge. The link between the physical and mental phenomena would still be wanting, and it would be as idle to speculate on the nature of the relation between mind and matter, as on the proximate cause of gravitation, or of magnetic attraction and repulsion.

THE FIFTH DIALOGUE.

Mental Faculties of Animals. — Their Relation to the Structure of the Brain. — Difficulty of the Inquiry, but some Knowledge of it not beyond our Reach.— Cerebral Organs connected with the Animal Appetites and Instincts.—Organs subservient to the Intellect.— Question as to the Uses of the Cerebral Convolutions. —The Posterior Lobes of the Cerebrum.—The Corpus Callosum.—The Development of the Mental Faculties, how far dependent on the Perfection of the Senses, and other external Circumstances.—The Nature and Office of Instinct. — Intelligence not peculiar to Man, nor Instinct to the lower Animals.—Human Instincts. —The Social Instinct and the Moral Sense. — Some Instincts as necessary to Animal Existence as the Circulation of the Blood, and other mere Animal Functions. — Acquired Instincts transmitted from Parents to Offspring.—These considered with reference to Moral and Political Science. — The Social Instinct viewed as correcting or modifying other Instincts, and as being made more efficient by the greater Development of the Intellect.—The Religious Instinct.—Primary Truths of Buffier and Reid.

It was one or two days after the conversation, which has been just recorded, that we found ourselves in the afternoon on the side of a hill on which some sheep were scattered, watching the operations of the sheep-dog, who was collecting the flock previously to their being driven home for the night. This led to a conversation respecting the habits and faculties of animals; and Eubulus related the history of a dog who, having been taken in a carriage, and by a circuitous route, to a distant place, nevertheless, some time afterwards, found his way back to his former home, having, as it appeared, gone across a tract of country, with which he could have had no previous acquaintance.

Ergates. There are very many well-authenticated instances of the same thing. It is even said that dogs carried across the sea have travelled back to their former place of abode, having established themselves on board ship for that purpose. Nor is this faculty peculiar to dogs. At least I have read an account of herds of cattle in New South Wales which, having been removed from their accustomed haunts to new pastures at a considerable distance, have nevertheless returned, not by the road which they had gone before, but by going straight across the country, through wilds which they had never before traversed.

EUBULUS. There are few more interesting subjects of inquiry than that of the moral and intellectual qualities of other animals, yet there are few of which we know so little. There are, it is true, a good many scattered observations relating to it; and I may especially refer to the very interesting collection of facts which are recorded in one of Lord Brougham's dialogues.* No one, however, has devoted himself to such inquiries in the same way as many have done to other departments of knowledge. The papers of Frederic Cuvier are truly scientific, and contain much important matter, but they relate to a very limited number of animals. He began the study too late, and died too early, to make any considerable progress in it. Such an investigation is, indeed, attended with peculiar difficulties, and to pursue it with advantage would afford ample occupation, even with the largest opportunities, for the entire period of a man's life.

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* Dissertations on Subjects connected with Natural Philosophy, by Henry Lord Brougham, vol. i. dial. 3.

ERGATES. It may be, as I observed on a former occasion, that some of those which are usually regarded as the very lowest form of animal life, have no endowments superior to those which belong to vegetables. Setting these aside, however, I apprehend that no one who considers the subject can doubt that the mental principle in animals is of the same essence as that of human beings; so that even in the humbler classes we may trace the rudiments of those faculties, to which in their state of more complete development we are indebted for the grandest results of human genius. We cannot suppose the existence of mere sensation without supposing that there is something more. In the stupid carp which comes to a certain spot, at a certain hour, or on a certain signal, to be fed, we recognise at any rate the existence of memory and the association of ideas. But we recognise much more than this in the dog who assists the shepherd in collecting his sheep in the wilds of the Welsh mountains. Locke, and Dugald Stewart following him, do not allow that "brute animals have the power of abstraction." Now taking it for granted that abstraction can mean nothing more than the power of comparing our conceptions with reference to certain points to the exclusion of others; as, for example, when we consider colour without reference to figure, or figure without reference to colour; then I do not see how we can deny the existence of this faculty in other animals any more than in man himself. In this sense of the word, abstraction is a necessary part of the process of reasoning, which Locke defines as being "the perception of the agreement or disagreement of our ideas." But who can doubt that a dog reasons, while he is looking for his master, whom he has lost; or (as in the instance of which we were speaking just now) when he is seeking his way home over an unknown country?

CRITES. But if my recollection be accurate, Dugald Stewart does not mean to deny that brute animals are capable of the simpler forms of reasoning. He merely states that being unable to carry on processes of thought by the help of artificial signs (that is of language), they have no power of arriving at general or scientific conclusions.*

Ergates. Without doubting for an instant the vast superiority of the human mind, still it appears to me to be difficult to say how far the capacities of brute animals are limited in these respects. It is not to be denied that the aid of language is necessary to the carrying on any long, or complex, process of reasoning. But we see, nevertheless, that those who are born deaf and dumb reason to a great extent; and, on the other hand, it may well be questioned whether some animals are so wholly unprovided with language as Dugald Stewart supposes.

Eubulus. I am inclined to believe with Ergates, that the minds of the inferior animals are essentially of the same nature with that of the human race, and that of those various and ever-changing conditions of it, which we term the mental faculties, there are none of which we may not discover traces more or less distinct in other creatures. Still, in the degree in which these faculties exist, there is a vast difference, not only between what they are in man and in other animals, but in other animals among themselves. And this leads us to another subject, on which I shall be glad f Ergates can give us some information.

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* Moral Philosophy, vol. iii. p. 393. edit. 1827.

It being admitted that the brain is the material organ in connection with the mental principle; and it being also admitted that there is in the different species of animals, on the one hand, a great difference as to the extent of their moral and intellectual faculties, and on the other hand a not less remarkable difference in the size and formation of the brain; so we cannot well avoid the conclusion that these two orders of facts are, in a greater or less degree, connected with each other. I do not mean to infer from this connection that the mind is always the same, and that the greater or less development of it depends altogether on the greater or less perfection of the material organ. It may well be supposed that the original difference is in the mind itself, and that the Creator has so ordered it that the brain in the different species of animals should be such as will meet the requirements of the peculiar mind with which it is associated;—a view of the subject, which, if I am not misinformed, derives no small support from the researches of modern physiologists. I understand that the embryos of all the vertebrate animals have in the first instance the same character, or so nearly so, that they cannot be distinguished from each other: that starting, as it were, from one common point, the changes which the embryo undergoes differ, not only in different classes, but in different genera and species, as if something were superadded to the physical organization, by which those changes are regulated, and differently directed, thus giving origin to that immense variety of forms of animal life, which we see everywhere around us. However that may be (and I admit that it is idle, if not presumptuous, to speculate on a subject, as to which we are so entirely without the means of obtaining any actual knowledge), it does not at all affect the question as to the relation which exists between the organization of the brain and the mental faculties; and what I wish to know is, how far does our knowledge of this relation really extend? Is it possible from any experience that we have of the habits and character of a particular tribe of animals, to predicate what kind of brain we should find them to have on dissection, or from our observations on the latter, to form an opinion as to their moral and intellectual capacities?

Ergates. To a limited extent this knowledge is within our reach. If two brains were placed before me, in one of which the cerebral hemispheres were largely developed, while in the other they were very little developed, or altogether absent, I should at once pronounce the former to indicate the existence of a much greater intelligence than the latter. But I see no reason to doubt that we might learn more than this; and that an individual, who, in addition to ample opportunities of examining the brains of different animals by dissection, had equal opportunities of studying the habits and behaviour of the same animals while alive, and who himself possessed the necessary qualities for such investigations, might, in the course of time, and after some years of thought and labour, arrive at some very interesting and satisfactory results. If, hitherto, so little progress has been made in this department of knowledge, that is easily accounted for. The combination of opportunities which I have suggested, is of very rare occurrence, and, when it does occur, few persons are qualified to take proper advantage of it. It is, indeed, very far from being a matter of course that the anatomist, who has successfully pursued his own plain matter-of-fact science, should be the one best fitted for observing and comparing the fleeting phenomena of the mind, the study of which, presented as they are to us only through the medium of their external manifestations, must be proportionally more difficult as they differ from the only standard of comparison which we possess in our individual selves.

EUBULUS. You might have mentioned another difficulty,—that we seldom see other animals in their free and natural state, or otherwise than as being cowed and oppressed by the superiority of man. I suspect that, from this cause, we are led to under-estimate, on the whole, the moral and intellectual qualities of inferior creatures. How little should we know of man himself if we studied him only among the slaves of a Virginia planter! The rook confined in a cage would afford us but little information as to what the rook may be in the republic of his native rookery. The horse tied to his manger in our stables is a very different animal from the horse which is domesticated in his master's family in the Arab's tent; and he must be still more different from him who wanders over the prairies of America under the dominion of his chief. Even if we could live in a colony of rooks, or in a herd of wild horses, not having the means of communicating with them, such as these animals certainly have among themselves, how difficult would it be for us to obtain any real knowledge as to their moral and intellectual condition! How little should we know even of our own species in this respect, if we had not the power of mutually communicating our desires and thoughts through the medium of oral and written language!

Ergates. You will not then be surprised to learn how little has been done towards connecting physical organization and mental phenomena with each other. The observations of Magendie, Flourens, and some other physiologists are interesting as far as they go; but they throw no light on the more difficult and recondite subject, which we are now discussing. There is, indeed, only one fact connected with it which can be considered as well established. Those bodies, situated in the base of the brain, to which in the human subject we give the names of *medulla oblongata, cerebellum, thalami, corpora striata,* and *tubercula quadrigemina,* and the parts corresponding to these in other vertebrate animals, are connected with that class of phenomena which belong to the animal appetites and instincts; and the two larger masses, which are placed above them, and are known as the cerebral hemispheres, are more especially subservient to the higher faculties belonging to the intellect. The proof of what I have now stated is that in the lower classes of vertebrate animals, in whom the appetites and instincts predominate over the intellect, the first-mentioned bodies form almost the entire brain, and that, very much as the intellect is more developed, so are the cerebral hemispheres more developed also; the degree of their development being more remarkable in man than in any other animal.* Some apparent exceptions to this rule are easily explained. In birds, which are so much more than man, or than quadrupeds, under the dominion of instinct, the cerebral hemispheres appear at first sight to be of great size in proportion to the rest of the brain. But you may recollect that on a former occasion, I explained that they are not so in reality, and that the

* See Additional Note F.

only part, which can properly be compared with the hemispheres, is a layer of cerebral substance laid on the surface of two other bodies (the *corpora striata*), these being of an enormous size. Again, in some of the cetaceous, and in one or two of the quadrumanous animals, the cerebral hemispheres are so large in proportion to the rest of the body as to approach very nearly to what they are in man himself. But their size is only one thing to be taken into the account. Although a steam-engine of great power must be of certain dimensions, something will depend on its peculiar construction. So it probably is with regard to the cerebral hemispheres. They consist of two parts, the white, medullary or fibrous substance, which forms the greater portion of their bulk, and the more vascular grey substance, which is expanded on their surface. I stated formerly that the latter is supposed to be the part in which the nervous force is generated; and, therefore, the most important of the two structures. The surface of the hemispheres is formed into folds, or convolutions, and as the fissures by which these are separated are deeper and more numerous, so does the grey bear a larger proportion to the medullary substance. In animals of a very low degree of intelligence, as in the kangaroo for example, the convolutions are almost entirely wanting. In man they are more remarkable as to number and depth than in any other animal, and hence some very eminent physiologists, not without some show of reason, have been led to believe that it is by his organization in this respect that he is adapted to the exercise of that high degree of intelligence which places him at so vast a distance above the rest of the animal creation.*

Whether this hypothesis be or be not well-founded, it is to be observed that it is not merely as to its greater volume, and the greater extent of the convolutions of the cerebrum, that the brain of man differs from that of other animals. Comparing it with the brains of the other mammalia (and it is only with these that it much admits of comparison in reality), we find that the posterior lobes of the cerebrum are almost peculiar to the human race. The only other animals in which they exist are those of the tribe of monkeys, and in them they are of a much smaller size than they are of in man. The absence of the posterior lobes includes the absence of what seems to be a special organ situated in the lower part of the posterior elongation of the lateral ventricle, known by anatomists under the name of the *hippocampus minor*. The *corpus callosum* is the name given to a broad thick band of nervous fibres which unites the two cerebral hemispheres, as if for the purpose of bringing them into harmonious action with each other. In the kangaroo, which I have already mentioned as having a very low degree of intelligence, the *corpus callosum* is altogether wanting. This fact in itself might lead us to conjecture that some important office is allotted to it; and the opinion is confirmed by observations made on the human subject. Cases are on record in which this organ was wanting either wholly or in part.

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* See Additional Note G.

In none of them could it be said that the intellectual faculties were altogether deficient. But in all of them there was an incapability of learning, producing an apparent dulness of the intellect, so that the individuals were unfit for all but the most simple duties of life. *

EUBULUS. I grant that you have sufficiently established the proposition with which you set out. At the same time it would seem that the organization of the brain does not indicate the actual extent to which the mental faculties are exercised, nor anything more than the capability of exercising them. Having certain original endowments, which differ in different individuals, the mind is made what it is by the force of external circumstances. How different was that of the savage of Aveyron from what it might have been if she had been trained to early habits of obedience and self-denial, and had been taught to make use of those powers of attention and reflection which God has con-

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* See Mr. Paget's and Mr. Henry's observations in the Medico-Chirurgical Transactions, vols. xxix. and xxxi.

ferred to a greater or less extent on all of us, but which run to waste if neglected. It is by no means impossible that in some nation of savages there may be an individual with such natural endowments that if placed under exactly similar circumstances he might have become another Newton, and we may be assured that Newton would have been quite different from what he really was if he had been born and bred among the Aborigines of Australia. The external circumstances on which the mind more immediately depends are the organs of sense, as it is through them that all knowledge is originally derived, and as without them it would have none of the materials of thought. The mind of an individual who labours under congenital blindness, or congenital deafness, cannot fail to be imperfect as compared with that of others, except where great pains are bestowed on the application of those means which science has furnished for supplying the deficiency; and the imperfection must be greater still in those instances in which these two calamities are unhappily combined.

Ergates. You may extend your observations to other animals, and add that as among them there is a considerable difference as to the structure and relative value of the organs of sense, so this must be taken into the account if we would form even a rough estimate (and we can form no other) of their mental condition. In birds the eye is a more complicated, and evidently a more perfect, organ than it is in our own species, or in the mammalia generally. The eye of an eagle is nearly as large as that of an elephant; he has a wider range of vision, and can distinguish objects at a distance at which they would be to us altogether imperceptible. In this respect he has means of obtaining knowledge which men do not possess, and so far has an advantage over us. Having the power of ascending to the higher regions of the atmosphere, it is plain that the external world must be presented to him under a very different aspect from that under which it is presented to ourselves. But this is no solitary instance. There are many other animals which have organs of sense more perfect, and many others which have them less perfect, than they are in the human race; and whatever that difference may be, it must lead to a like result by modifying their perceptions, and, if I may be allowed the expression, their notions of things external to themselves.

EUBULUS. We cannot suppose it to be otherwise. The astronomer who contemplates the planets and the Milky Way, and discovers revolving stars and remote nebulæ by means of the telescope, may be regarded, as far as the heavenly bodies are concerned, as being endowed with another sense, so that the impressions which they produce on his mind must be quite different from those which they produce on the mind of the peasant, who knows nothing of them beyond that which is disclosed to his unassisted vision. But how much greater difference would there be if his eye were so constructed that, without the aid of glasses, it answered the purpose of a telescope for distant objects, and of a microscope for others!

ERGATES. The dog distinguishes external objects from each other less by his sense of sight than by his sense of smell, of which last we ourselves make so little use. The whiskers of a cat, each having a special nerve belonging to it, form a much more delicate organ of touch than the human fingers. There is reason to believe that some insects are enabled to take cognisance of the electric state of the atmosphere, as we take cognisance of heat and cold. The eyes of insects are very different from the eyes of the higher classes of animals, consisting sometimes of as many as a thousand hexagonal and transparent plates, arranged, not in the same plane, but at angles to each other, so as to form altogether a large portion of a sphere, each having belonging to it what seems to be its own peculiar retina. With eyes such as these the vision of insects must be very different from ours, having an enormous range, with no such distinct picture as is formed on the human retina, and probably affording its possessor less perfect means of distinguishing near and distant objects from each other. On the other hand, the mole has an imperfect eye, and the *mus typhlus*, or subterraneous rat, the *proteus*, and the *siren*, are altogether deprived of the sense of sight. It is plain that the relations of these animals to the external world, and their conceptions of objects external to themselves, must differ according to the difference in their respective faculties of sense.

Still, as Frederic Cuvier justly observes, "we must not, therefore, exaggerate the influence of the organs of sense on the mental functions; nor can we admit the doctrine which some authors have held, that the perfection of the intellect depends very much on the greater or less perfection of these physical organs."* This is, indeed, clearly an hypothesis unsupported by facts. The eye and ear of the seal are so constructed that he must have very moderate powers of sight and hearing, and, except through the medium of his whiskers, it may be said that he has no sense of touch at all. Nevertheless, the philosopher whom I have just named, who had ample opportunities of studying the habits of the seals in the *Jardin des Plantes*, describes them as being possessed of intelligence above the average of that which belongs even to the higher classes of the mammalia. *

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* Annales du Muséum d'Histoire Naturelle, tome xvi. p. 54.

Eubulus. The remarks which you have just now made are equally applicable to the hypothesis which some one has advanced that man is made what he is by the possession of the hand, as a more perfect organ of prehension peculiar to himself; and thus we fall back on your original proposition, that, as far as his physical organization is concerned, it is in that of the brain alone that we are to look for the evidence of his superiority to other creatures.

Crites. I may now venture to make an observation, which I should have made before, if I had not been unwilling to interrupt the conversation. When you speak of instinct, as contradistinguished to the higher faculties of the intellect, I conclude that you refer to it as a principle by which animals are impelled, independently of experience and reasoning, to the performance of certain voluntary acts, which

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* Annales du Muséum d'Histoire Naturelle, tome xvii. p. 397.

are necessary to their preservation as individuals, or the continuance of the species, or in some other way convenient to them. Now I would ask if it be quite clear that this distinction is well founded? Has it not been the opinion of some physiologists that by a careful analysis of what are called instinctive actions, they may be traced to the operation of experience, quite as much as those which are more palpably derived from this source?

ERGATES. You may refer especially to the first Dr. Darwin, whose great but singular genius was apt to travel too fast for the cautious pursuits of science. Let me state a few facts, and then leave you to judge for yourself.

Food is required because life cannot be maintained without it. But no one under ordinary circumstances thinks of this ultimate object. We have an uneasy sensation which we call hunger, and it is merely to remove this sensation that we are led to eat. This is the simplest form of instinct, and it goes far towards explaining others which are more complicated.

The desire for food is the same in the newly born child as in the grown-up man; and when applied to his mother's breast he knows at once how to obtain it by bringing several pairs of muscles of his mouth and throat successively into action, making the process of suction. The newly-born calf knows at once how to balance himself on his four legs, to walk, and seek the food with which he is supplied by his mother. The duckling hatched by the hen, as soon as his muscular powers are sufficiently developed, is impelled by the desire to enter the neighbouring pond, and when in the water, without example or instruction, he calls certain muscles into action, and is enabled to swim. When a sow is delivered of a litter, each young pig as it is born runs at once to take possession of one of his mother's nipples, which he considers as his peculiar property ever afterwards. So the bee prepares his honey-comb, and the wasp his paper nest, independently of all experience or instruction. It is worth your while to refer to the luminous exposition which Lord Brougham has given of the mathematical accuracy with which the former does his work. Yet I do not see that it is at all more marvellous than what we see in the young calf. It would require a profound knowledge of mechanics, and a long investigation, to determine beforehand what muscles should be called into action, and in what order they should act, to enable him to balance himself on his feet, to stand and walk. Yet all this he accomplishes at once, as if it were a mere matter of course. I do not see how these and a thousand other things can be explained on the hypothesis of Darwin, or otherwise than by supposing that certain feelings exist which lead to the voluntary exercise of certain muscles, and to the performance of certain acts, without any reference at the time to the ultimate object for which these acts are required.

EUBULUS. It would seem that it is in the proportion which their instincts and intelligence bear to each other that the difference between the mind of man and that of other animals chiefly consists. Reasoning is not peculiar to the former, nor is instinct peculiar to the latter.

Even as regards insects, which are generally, and properly, regarded as being below the vertebrate animals in the scale of existence, and whose nervous system is of so simple a structure as to admit of no comparison with that of the human subject, we cannot well hesitate to believe that they are not altogether deprived of that higher faculty which enables ourselves to apply the results of our experience to the new circumstances under which we are placed.

> "Esse apibus partem divinæ mentis,"

is no mere fiction of poetry. It is by instinct that the bee collects his honey, and constructs the hexagonal cells of his honey-comb (always according to the same pattern) from the wax furnished for that purpose by his own secretions. But instinct will not account for all that he does besides. When a swarm is transferred to a new hive placed among many others, at first they are found frequently mistaking other hives for their own, and it is only by experience that they are taught after some time to distinguish the particular hive in which their queen is lodged.* Their habit is to build their honey-comb from above downwards, attaching it to the upper part of the hive. On one occasion when a large portion of the honey-comb had been broken off they pursued another course. The fragment had somehow become fixed in the middle of the hive, and the bees immediately began to erect a new structure of comb on the floor, so placed as to form a pillar supporting the fragment, and preventing its further descent. They then filled up the space above, joining the comb which had become detached to that from which it had been separated, and they concluded their labours by removing the newly constructed comb below; thus proving that they had intended it to answer a merely temporary purpose. I state this on the authority of a gentleman whose attention has been much directed to these and similar inquiries.

The observations of M. Dujardin place it beyond a doubt that bees have some means of communicating with each other, answering the purpose of speech. When a saucer containing syrup was placed in a recess in a wall, and a bee conveyed to it on the end of a stick which had been also smeared with syrup, he remained there for five or six minutes, and then flew back to his hive. In about a quarter of an hour thirty other bees issued from the same hive, and came to regale themselves on the contents of the saucer. The bees from the same hive continued their visits as long as the sugar remained in the state of syrup and fit for their purpose, but none came from another hive in the neighbourhood. When the sugar was dry, the saucer was deserted, except that every now and then a straggler came, as if to inspect it, and if he found that by the addition of water it was again in a state of syrup his visit was presently followed by that of numerous others. *

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* Principles of Physiology, by W. Carpenter, M.D. Second Edition, p. 224.

If even a portion of the observations made by the younger Huber on ants be well-founded, these little creatures must be regarded as possessing, in addition to their instincts, no small

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* Annales des Sciences Naturelles, tome xviii. p. 233.

portion of intelligence. It is observed by a modern writer that "there is hardly a mechanical pursuit in which insects do not excel. They are excellent weavers, house-builders, architects. They make diving-bells, bore galleries, raise vaults, construct bridges. They line their houses with tapestry, clean them, ventilate them, and close them with admirably fitted swing-doors. They build and store warehouses, construct traps in the greatest variety, hunt skilfully, rob and plunder. They poison, sabre, and strangle their enemies. They have social laws, a common language, division of labour, and gradations of rank. They maintain armies, go to war, send out scouts, appoint sentinels, carry off prisoners, keep slaves, and tend domestic animals. In short, they are a miniature copy of man rather than that of the inferior vertebrata."* Of these things which have been thus graphically described much may indeed be referred to the operation of instincts, or to what Dr. Carpenter terms "unconscious cerebration;" but surely it involves a considerable *petitio principii* not to refer a part of them to a higher principle, bearing a resemblance, however remote, to human intelligence.

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* British and Foreign Medical Review, No. 23. p. 10.

It would be easy to extend observations such as these to other parts of the animal creation. On the other hand, man, gifted as he is with such (comparatively) vast capacity of memory and reflection; with such powers of observation; laying up stores of knowledge, not only for himself and for those now in existence, but also for generations which are to come; living not merely in the present time, but also in the past, and even in the future; whose aspirations lead him to inquiries of a higher nature, beyond the visible and tangible world in which he is placed; even man, such as he is, is in many respects the creature of instincts: and what would he be without them? As Ergates has already remarked, when he seeks food it is at the moment, not because his reason and experience tell him that he would die without it, but because he is impelled to do so by the uneasy sensations which the want of it occasions. So also is thirst an instinct. The child is attracted to the mother's breast by instinct. The love of the parent for the child, and the desire to avoid danger and prolong life, are instincts also.

Man could not exist as a solitary being. He has neither swiftness of feet, nor any natural means of offence and defence, which would enable him to compete with the buffalo, the lion, or the wolf. It would have been of little avail to him if the Creator had left it to himself to learn by hard experience that he can procure his own safety, and his means of subsistence, only by associating with others. The desire to live in society is as much an instinct in him as it is in the bee, or the ant, or the beaver, or the prairie dog. Ought not this to settle the disputed question as to the existence of a moral sense? For how could mankind live in society, helping and protecting each other, and joining in common pursuits, if they were not so constructed as to sympathise with each other in their joys and sorrows, and if they did not feel individually that they owe to others what they expect others to offer them in return. Experience, and, if you please, self-interest, tend to confirm, to refine, to exalt these sentiments, but they do not create them. The child is led to seek the society of other children by an impulse which he cannot resist, and which is independent of any intellectual operation. But having done so, his moral qualities, which would otherwise have remained in abeyance, are gradually developed, and (except there be some actual imperfection of the mental faculties) the power of distinguishing right from wrong, justice from injustice, follows as a matter of necessity, the result of an innate principle, and not of anything acquired.

Crites. All that you have now stated leads to this conclusion, that although it is only as to the higher faculties of the mind that mankind *proprius accedunt ad Deos;* that it is only as to these that the Deity has created man in his own image; it is not less true that as to mere animal existence these are of much less importance than the lower faculties of instinct. If the Deity had no other intention than that of maintaining on the surface of the globe a large number of living beings susceptible of enjoyment and indulging in sensual gratifications, with a very small proportion of painful feelings, such intention would have been sufficiently carried out by the creation of animals endowed with imperfect memory, with no capability of experience, with no thought as to the future, and acting solely under the direction of instinct. That the scheme of creation is not thus limited, and that it tends to some ulterior and grander object, we may well conclude from the existence of that principle of intelligence, the dawning of which we observe in the lower animals, and which we find more completely developed in the human race.

EUBULUS. It seems, indeed, to be as you have stated, that animals may, and that some animals probably do, exist by means of instinct alone, and without possessing any of the superior intellectual faculties. The converse of this proposition, however, does not hold good, and it is plain that the latter would be quite insufficient unless they were accompanied by instinct. Without it, experience and the anticipation of what is to come founded on the recollection of the past, would be the only guide, and these of course cannot belong to the newly created or newly born animal. Indeed, we cannot but suppose that when man first began to exist, and for some generations afterwards, the range of his instincts must have been much more extensive than it is at the present time. We see the infant first deriving nourishment from his mother's breast, but when the period of lactation is over, the experience of his parents supplies him with the fit kind of food derived from other sources. The absence of such experience must, in the first instance, have been supplied by a faculty which he does not now possess (but which we see manifested in the lower animals), directing him to seek that which is nutritious, and to avoid that which is not so, or which is actually poisonous. It is easy to conceive that much besides in the habits and actions of human beings which seem now to be the results of experience and imitation, was originally to be traced to instinct; and indeed there are many things which cannot well be explained otherwise. I do not venture to say that from this source he first derived the use of fire: yet it does not seem that in such an instinct there would be anything more remarkable than in that which leads the bee with the skill of a mathematician to construct his hexagonal cells; and considering how terrible and destructive an agent fire, if discovered accidentally, must have appeared to be, it is difficult to conceive how uncivilized and untutored man could have been led by mere experience to convert it to the purposes of his own comfort and convenience. It may be further observed that except in the tropical regions of the globe fire is almost as necessary to his existence as food or clothing, and that without it he could not have filled that place which he seems to have been destined to fill in the creation. It was probably under the influence of views similar to these that the Heathen mythologists invented the fable of Prometheus having stolen it from the Gods.

On the other hand, if we study the habits of other animals, we cannot doubt that there are many which, however much they are dependent on their instincts, profit also by experience, though in a less degree than man; and it is probable that these, not less than the human species, when first called into existence were endowed with instincts which they do not now possess.

Ergates. Continuing your line of argument, I may observe that the circulation of the blood, respiration, digestion, the secretion of the kidneys, being immediately necessary to life, are nearly the same under all circumstances, being subject to no material variation except when interrupted by accident or disease. There are certain instincts to which the same observation may be applied. A patient in a lunatic asylum may, as a consequence of his malady, lose the instinct which constitutes the desire for food, so that he would die of inanition if food were not introduced into his stomach by artificial means; or he may lose the instinct of self-preservation and commit suicide. But otherwise these particular instincts are as invariable as the functions of the vital organs.

There are other instincts which are intended to adapt the animal to the peculiar situation in which he is placed, and liable to vary with the circumstances for which they are required. Acquired habits in several successive generations become permanent, and assume the character of instincts, and thus we have the opportunity of seeing new instincts generated. I walked in the fields during the autumn with a young pointer dog which had never been in the fields before. He stopped and pointed at a covey of partridges. M. Magendie relates an analogous anecdote of a retriever. He bought him as a puppy in England, and took him to France. Though never having been trained for the purpose, he knew his duty as a retriever, and performed it sufficiently well when taken into the fields. Mr. Andrew Knight has given an account of other facts of the same kind. It is probable that if we had the opportunity of studying the conditions of the herds of wild horses which roam over the prairies of America, we should find that they are born with instincts which their ancestors did not possess in their domesticated state, and which they would lose if again brought under subjection to man.

Crites. May not the habit of using the right hand in preference to the left be one of the acquired instincts to which you have now referred?

Ergates. Certainly it may be so. But is it not more probable that it was an original instinct? Although we every now and then meet with a left-handed individual, I am not aware that there has ever been a left-handed nation. The reason of our being endowed with this particular instinct is sufficiently obvious. How much inconvenience would arise where it is necessary for different individuals to cooperate in manual operations, if some were to use one hand and some the other?

However that may be, we must suppose that the conversion of an acquired habit into an instinct is attended with some actual change in the organization of the brain; and in this there is nothing more remarkable than in many other changes which occur in animals in consequence of an alteration in their mode of life. Thus the thorough-bred horse has more compact bones and a thinner skin than the cart-horse. The elephant which had been preserved in a mass of ice on the borders of the Northern ocean was covered with hair, which is altogether wanting among his kindred of the South; and still more remarkable examples of changes of this kind may be found among our domesticated animals, especially in dogs.

CRITES. This is a subject which is not only interesting as a matter of science, but also of considerable practical importance. Setting aside his physical condition, and the influence of another climate on his health, would the infant born of Esquimaux parents, living in huts of snow, in the dreary regions of the north, be equally fitted with the negro to assume the habits and mode of life of those whose ancestors have resided during many successive generations under a tropical sun, amid the luxuriant vegetation of a tropical climate? or would the infant negro be fitted to undertake the life of the Esquimaux? The negroes of Haiti, who passed at once from a state of slavery into that of freedom and the imitation of civilized life, are already relapsing into barbarism, and returning, in spite of the humanizing influence of Christianity, to the superstitions of their African progenitors. In like manner, nations become adapted to the peculiar mode of government under which their ancestors have lived; and experience has shown that it is equally dangerous suddenly to change a despotism for a free constitution, or the latter for a despotism. The original founders of the French revolution had grand objects in view. They saw how much free institutions tend to elevate the character and extend the happiness of mankind, and they had a strong apprehension of the opposite tendency of the former government of their country. But they overlooked the fact, that no government is good for which those who are to live under it are unprepared, and they failed by attempting too much. If they had been content with beginning the work of regeneration with a prospect of a further, but gradual improvement in the course of after generations, it is probable that their country would never have groaned under the tyranny of the mob, nor have sought refuge from it under the milder despotism of the Emperor. On the same principle it is that civilization can be only gradually advanced; and that all that the Czar Peter could accomplish was to produce an outward semblance of it in his capital, while the masses of the large population of his empire remained as barbarous as they were before he attempted to force civilization on them. The sudden emancipation of the negroes in the slave-holding States of America would be productive of nothing but misery and ruin to themselves and the white population; while there is good reason to believe that a different result would follow if they and their masters were gradually prepared for so great a change during even two or three successive generations.

EUBULUS. In what you have now said you have in part anticipated some observations which I was about to offer. While the study of instincts in other animals is interesting to the naturalist and physiologist, that of the instincts of the human race is not less interesting to the moral, and, I may add, to the political philosopher. The majority of instincts belonging to man resemble those of the inferior animals, inasmuch as they relate to the preservation of the individual and the continuation of the species. To these the social instinct is superadded, not indeed, peculiar to man, but in him attaining a greater degree of development than in other creatures. This may be regarded as being in many respects antagonistic to the other instincts; and in order that society should exist, it is necessary that the latter should be in a great degree subjected to the former. The first impulse of a hungry man, not less than that of a hungry wolf, is to possess himself with food wherever he finds it. When Dr. Davy, on the bank of a river in Ceylon, found the young alligator just escaping from his egg, the newly born animal, assuming an attitude of defiance, bit the stick which opposed his progress. So the natural disposition of man is to defy opposition and resent an injury. The social instinct is intended not to extinguish but to modify and correct his other instincts. But for the attainment of this object it is not in itself sufficient. It requires the aid of experience, education, example, and reason. In proportion as the intellectual faculties are more perfect, so is the social instinct more efficient. The gregarious elephant is more intelligent than the solitary tiger. As the dog is more intelligent than the cat, so has he social and moral qualities which the latter does not possess; and in like manner human society is a more perfect institution than that of any other animals which live in association. Nor must we omit the operation of another cause which mainly contributes to the attainment of that higher degree of civilization in which the sentiment of duty prevails over the more selfish appetites. The disposition of man, even in his most degraded state, to believe in supernatural agencies is so universal, and so manifestly the result of his peculiar constitution, that we must regard it as having very much of the character of an instinct. As he advances in knowledge and has leisure for observation and reflection, the perception of the beauty, grandeur, and harmony of the universe, of the evidence of intention and design, and of the adaptation of means to ends in everything around him, and of the large amount of good with the small proportion of evil, which is manifested in the condition of all living creatures, leads him to the knowledge of an intelligent and beneficent Creator, to whom he *may* at any rate be responsible for the right use of the faculties with which he is endowed; and thus the religious sentiment becomes engrafted on the rude instinct of the savage. Thus, man as he exists under the best form of civilization, is made what he is by the operation of various causes. There are his original instincts, without which he could no more have continued to exist than without the action of the heart. There are habits, which begun in one, and continued in subsequent generations, become confirmed in him, and bear a close resemblance to instincts. These modify and correct each other, and they are all, in a greater or less degree, under the dominion of the intellect. Such is the general view which we must take of his condition: but if we attempt to make a more exact analysis of it, we find the problem too complicated for a satisfactory solution; the various influences to which he is subject being so intermixed with each other, that it is impossible for us to determine in each particular instance how much of his sentiments and conduct is to be attributed to one of them, and how much to another.

CRITES. You have referred to the disposition of human beings to believe in supernatural agencies as partaking of the character of instincts. If you are correct in so doing, it seems to me that you may with equal reason include in the same category our belief in the existence of a material world; our belief that what we remember as having happened, happened in reality; in short, in all that some have intended to describe under the name of innate ideas; and that Buffier, and Reid after him, regarded as primary and fundamental truths; the knowledge of which is forced upon us by our own constitution, and is independent of experience and reasoning. Now, although I do not admit the exactness of the catalogue of these primary truths, which has been furnished to us by the writers whom I have mentioned, and, indeed, do not doubt that they have included in it some kinds of knowledge which are derived from other sources, yet I do not dispute the correctness of their general views; and, indeed, it is plain that it has been practically admitted by even the most sceptical of those philosophers who have written on the subject. But are we really justified in regarding such kinds of belief as being of the nature of instinct?

EUBULUS. They differ from them in one very essential circumstance. It has been shown that instincts are far from being constant and immutable, as under a change of circumstances certain instincts are lost, so are others generated. Even those which are of the greatest necessity, which seem to be the most constant, may, under certain circumstances, be found to be wanting in an individual on whom they had been fully developed previously. But it is otherwise with those articles of primary belief which are represented as the foundation of all our knowledge. However strange may be the illusions of the lunatic, or however convincing the arguments of the metaphysician, neither the one nor the other can escape from the belief that there is an external world independent of himself, or that what he remembers to have happened did actually occur. Taking these things into consideration, it seems not unreasonable to suppose that this class of convictions has some higher source than that which belongs to mere instincts, and that they are actually inherent in the mental principle itself, and independent of our physical organization.

THE SIXTH DIALOGUE.

Views of Human Nature. — The Science of Human Nature — its Objects and Applications — to be distinguished in its higher Department from the mere Practical Knowledge of Human Character which Men acquire for their own Purposes.—Different Opportunities of pursuing the Study of Human Nature presented to different Individuals. —The Observation of the Influence of the Body on the Mind, and of the Mind on the Body, a necessary Part of it. — The Science of Human Nature essential to the Science of Government. — The Pretensions of Phrenology. — Anatomical Objections to it. — Observations on the Evidence on which it rests.— Consideration of the Question as to the Relation of the Size of the Brain to the Development of the Intellect. — General View of the Circumstances which tend to form or modify Men's Characters.—The Science of Human Nature not reducible to any Simple Rules.—Qualifications necessary for the Pursuit of it.—Self-knowledge.—Duties and Responsibilities.—Conclusion.

The term which we had allotted for our visit was drawing to a close. On the day preceding that of our departure, after wandering for some time exposed to the rays of an August sun, we found ourselves enjoying the shelter of the beech wood, which I have already mentioned as being in the neighbourhood of our friend's habitation. A tree which had been lately felled afforded us a seat. The cool shade was refreshing to us after the glare and heat of the sunshine in the open country; and the stillness and silence which prevailed afforded us the opportunity of renewing our conversation on subjects connected with those which we had discussed previously.

"It is probable," said Crites, "that such feelings might not be of long duration; but I own that at the present moment the scene which is presented to me forms a delightful contrast to the bustle and activity of my everyday life; and that it seems that I should be well contented to escape from the turmoil of the world, and the anxieties of a profession, and pass the rest of my days in some such retirement as this,—

> "'The world forgetting, by the world forgot.'

exchanging the study of the vices, caprices, and vagaries of mankind, for that of books and the contemplation of the beauties of the country."

Eubulus. You judged rightly in saying that these feelings might not be of long duration. I can assure you from my own experience, that such a mode of life as you seem to contemplate would never satisfy you unless you were to combine with it some worthy pursuit appertaining to others as well as to yourself. You would, if thus living only for yourself, soon find the social instinct of which we were speaking yesterday, as irresistible as that of hunger; so that you might as well pretend by a process of reasoning to abstain from eating if you were famished, as from seeking the society of your fellow-creatures, when you had been for some time deprived of it.

Further, it seems to me that you are not like your usual self, and that you do not quite do justice to mankind, when you refer merely to their vices, caprices, and vagaries. It is true that of these there is much in their composition, which we might well wish to have been otherwise; but let us not overlook the numerous examples which we meet with, of kind and generous actions, of sacrifices of self-interest made for the good of others in private, and sometimes even in public life. I have now lived long in the world, and have been mixed up with various classes of persons; and I may truly say that, although I have met with evil more than enough in others, and am not, I hope, altogether insensible of my own defects and failings, my individual experience has led me to entertain, on the whole, a better opinion of mankind than that which I should have had if I had studied the subject only in books. I speak, be it observed, of moral qualities. As to those of the intellect I own, that some time since, when I had the opportunity of passing an evening in the company of two lads belonging to the aborigines of Australia, I was lost in wonder, and could scarcely comprehend that from so rude a stock should have proceeded a race of beings so gifted as some of these with whom it has been my good fortune to be acquainted; so full of knowledge; penetrating into the mysteries of the material world; subjecting the physical forces to their will; at the same time analysing the phenomena of the mind itself; and ascending from thence to some knowledge, however limited, of the one Supreme Intellect which supports and regulates the universe. To us, situated as we are, with our duties and in our sphere of action, there is, I apprehend, no more worthy object of study than man himself; his instincts and higher faculties, his past history, his future destiny; in short, the "science of human nature" taken in its most extended sense. And in this sense it is a most extensive science indeed, including as it does anatomy and physiology; intellectual, moral, and political philosophy; ethnology, and I know not how much besides. Even the most abstract sciences, though not directly, are indirectly related to it, as we value them only in proportion as they tend to gratify the curiosity, supply the necessities, or elevate the character of man. As we commonly understand it however, the science of human nature has a more limited signification, implying a knowledge of the instincts, the passions, the intellectual capacities, the active power of our species, and, above all, the motives by which the conduct of individuals is regulated.

CRITES. Such as you have now described it, it may be said to be a science, which belongs as much to every individual among us as to the philosopher, dependent as we are on each other, and compelled as we are to learn something of the characters of those with whom we associate. The rich man's valet studies his master's temper and caprices, learns to anticipate his wants; in those matters in which he is himself concerned, saves him the trouble of acting and even of thinking for himself; and thus at last acquires an influence over him, which is not the less real because his master is unconscious of it. The statesman, the lawyer, the merchant, the medical practitioner, the speculator, these and others, in their several ways, study the disposition of other men, as far as it is necessary for them to do so, with a view to their own advantage, or to enable them better to perform the duties belonging to their respective callings.

EUBULUS. It seems, however, that we are

scarcely justified in dignifying the practical knowledge of human nature which men generally possess with the title of a science. For the most part they view it under only one of its numerous aspects; the sight of each individual not extending beyond the little clique to which he himself belongs; and there are none to whom this remark is more generally applicable than to those, who, independent of their own exertions, are born to the inheritance of ease and affluence. Those who study human nature as a whole form an exception to the general rule. Some have not the talent of observation; others have not the necessary leisure; and of those who are not wanting in these respects the greater part have not the inclination to do so.

CRITES. You may add that many have not the opportunity. Inquiries such as these cannot be carried on in a closet. They belong altogether to active life. Then be it observed that in some situations you come in contact only with a particular class, while in others the field of observation is more extensive. It seems to me that medical practitioners, if they know how to avail themselves of it, have in this repect an advantage over most other professions; partly, because they have to deal with every order in society, from the the high-born patrician and prosperous millionnaire, down to the poor man in the hospital, seeing them as they really are, under those circumstances of trial, which, more than anything else, level all artificial distinctions; but more especially, because they are necessarily led to contemplate the mind, not simply in the abstract, as is the case with the mere metaphysician, but in connexion with the physical structure with which it is associated.

Ergates. Certainly the opinion which you have now expressed seems not to be without foundation. It is the business of medical practitioners to study, not only the influence of the mind on the body, but also that of the body on the mind; and in so doing they have the opportunity of learning more than others to trace moral effects to physical causes. Where others complain of a fretful and peevish temper, it may be that they are led to make allowance for the difficulty of self-restraint, where there is a superabundance of lithic acid in the blood, or an organic disease of the viscera. In the catalepsy induced in a nervous girl by the so-called mesmeric passes, they see only one of the numerous phases of that multiform disease hysteria; and in the mischievous, and sometimes even in the benevolent enthusiast, who, by his sincerity and earnestness, enlists in the cause which he undertakes, the sympathy of the multitude, their more experienced observation will often detect the commencement of illusions and the germ of insanity.

It would, however, be a very great mistake to regard this kind of knowledge as being altogether peculiar to medical practitioners. In fact the connexion between the mind and body is in many instances too palpable to be overlooked by any practical observer of mankind. For example, it is referred to by Lord Chesterfield, when he says that many a battle has been lost because the general had a fit of indigestion; and you may recollect that I stated on a former occasion that Mr. Chadwick had already exposed the operation of living in an unwholesome atmosphere as inducing the habit of gin-drinking with all the frightful moral consequences which follow in its train. Still it must be admitted that members of the medical profession have better opportunities of obtaining knowledge of this kind than most other persons; and hence it is that in many things which even in these days of education, and in spite of the advancement of knowledge, others regard with wonder as the result of some unknown and mysterious agency, they, with some rare exceptions, see nothing that is not to be explained on well known principles, or in any degree more remarkable than the exploits of M. Robin or other conjurors.

EUBULUS. Some may pursue the inquiry with more or less of a philosophical spirit and others merely as a matter of practical observation and experience; but Crites has truly stated that some knowledge of human nature is necessary to all those who have any duties (however small) to perform in society, and the higher and more arduous these duties are, the greater is the amount of knowledge that is required. It forms the most essential part of the science of government, and to the want of it may be attributed many national calamities, and the greater part of the mistakes made by those to whom the affairs of nations are entrusted. The principal advantage possessed by an adventurer such as Cromwell, or the first Napoleon is, that he cannot have risen by his own exertions through the various grades, which he has occupied in the course of his career, associating with others on equal terms, without acquiring an insight into men's minds and characters, which he could not have acquired otherwise. The unhappy Louis XVI. and Marie Antoinette, surrounded as they had been by the etiquette and adulation of a Parisian court, received almost their first lessons in human nature from the brutal frenzy of a revolutionary mob. How different might have been the result both for themselves and for Europe, if they had had a less restricted intercourse with their fellow-creatures; or if at the head of a constitutional government, they had the opportunity of seeing the thoughts and feelings of the public, and the spirit of the times reflected by an independent press! The great Duke if he could have had an army such as he required, made to his hand, might by means of his military skill, have been a successful general, and "the conqueror of a hundred battles," but it would have been still a problem how that army had been created, and how he surmounted the various difficulties which he had to encounter, if the publication of his despatches had not disclosed to us the great insight which he possessed into the moral and intellectual qualities of others. A statesman may form grand conceptions in his closet, but these will be of little avail if he knows not how to select the right men to carry his plans into execution; or if, overlooking, or being ignorant of, the different characters of the different races of mankind he applies to one of them a mode of government which is fitted only for another.

CRITES. From the way in which you treat the subject, I suspect that you have disregarded, or are not a convert to, the doctrines of phrenology. Nevertheless, among my friends I am acquainted with some, and those too persons of much intelligence, who believe that these afford a sort of Royal road to a knowledge of men's dispositions and characters; and I well remember that, some years ago when Lord Glenelg occupied the situation of Colonial Secretary, a memorial, signed by many persons of repute, was addressed to him, seriously proposing that he should adopt the phrenological method of investigation, in order that he might make a classification of the convicts before they were transported to the colonies; it being further proposed that an experienced phrenologist should be taken into the service of the state, for the purpose of making the necessary examination of their heads.

I do not mean to say that I am myself either a believer or an unbeliever in the system; and I am led to mention it chiefly because Ergates, who has attended more than I have to questions of this kind, seemed, in one of our former conversations, to admit that there may be some foundation for these doctrines, when he expressed an opinion that the brain is not a single organ, but a congeries of organs, each having its peculiar function allotted to it.

Ergates. Such, certainly, is the conclusion at which I have arrived, and which seems to derive confirmation, both from the anatomical structure of the brain, and from the observations of experimental physiologists. But you must not, therefore, suppose that I have the smallest faith in what is called phrenology, which is quite a different matter. The phrenological theory is that, of the various instincts, dispositions, and talents, each has a separate organ allotted to it; that these organs, with only a single exception, are situated in the hemispheres of the cerebrum; that, in proportion as they are more or less developed, so is there a greater or less development of the faculties or qualities which they represent; that by the external figure of the head the relative size of these various organs may be ascertained; and, lastly, that we have thus afforded to us the means of determining the characters of individuals, so as to form a pretty accurate notion of what their future conduct will be, independently of all experience as to their conduct formerly. Now, there are two simple anatomical facts which the founders of this system have overlooked, or with which they were probably unacquainted, and which of themselves afford a sufficient contradiction of it.

1st. They refer the mere animal propensities chiefly to the posterior lobes, and the intellectual faculties to the anterior lobes of the cerebrum. But the truth is that the posterior lobes exist only in the human brain, and in that of some of the tribe of monkeys, and are absolutely wanting in quadrupeds. Of this there is no more doubt than there is of any other of the best-established facts in anatomy; so that, if phrenology be true, the most marked distinction between man, on the one hand, and a cat, or a horse, or a sheep, on the other, ought to be, that the former has the animal propensities developed to their fullest extent, and that these are deficient in the latter.

2ndly. Birds have various propensities and faculties in common with us, and in the writings of phrenologists many of their illustrations are derived from this class of vertebral animals. But the structure of the bird's brain is essentially different, not only from that of the human brain, but from that of the brain of all other mammalia. In order that I may make this plain, you must excuse me if I repeat what I said on the subject formerly. In the mammalia, the name of *corpus striatum* has been given to each of two organs of a small size compared with that of the entire brain, distinguished by a peculiar disposition of the grey, and the fibrous, or medullary substance, of which they are composed, and placed under the entire mass of the hemispheres of the cerebrum. In the bird's brain, what appears to a superficial observer to correspond to these hemispheres is found, on a more minute examination, to be apparently the *corpora striata* developed to an enormous size; that which really corresponds to the cerebral hemispheres being merely a thin layer expanded over their upper surface, and presenting no appearance of convolutions. It is plain, then, that there can be no phrenological organs in the bird's brain corresponding to those which are said to exist in the human brain, or in that of other *mammalia.* Yet birds are as pugnacious and destructive; as much attached to the localities in which they reside, and as careful of their offspring, as any individual among us; and I suppose that no one will deny, that if there be special organs of tune or of imitation in man, such organs ought not to be wanting in the bullfinch and parrot.

EUBULUS. I do not pretend to have much knowledge of anatomy, but even without it—from the perusal of the writings of Spurzheim and some other phrenologists—I had come very nearly to the same conclusion with that which may be deduced from the facts mentioned by Ergates. It seems to me that the classification of faculties which these writers have made is altogether artificial, and that it is not at all reasonable to suppose that for each of these a special material organ must be required. If we admit the separate existence of the thirty-three faculties, or propensities, enumerated by Spurzheim, we might with equal propriety admit the existence of fifty others, for which, however, the phrenological map of the head leaves no vacant space.

Then, when I consider the evidence on which the determination of the seat of the several organs is founded, I can conceive nothing more fantastic or unsatisfactory, or more unlike that which is considered to be necessary to the formation of just conclusions in other sciences.

Sometimes the seat of a particular organ is ascertained by a particular part of the head being warmer than the rest. It was thus that Dr. Gall was first led to detect the seat of the sexual passion in the cerebellum.* But is it really the fact that one part of the head is warmer than another if they are equally covered or uncovered? Was it ever found to be so by a delicate thermometer? or is it at all probable that so much more heat should be generated in one portion of the brain than is generated in other parts, as to be perceptible through the bone and skin, and the hairy scalp?

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* See Additional Note H.

The organ of philoprogenitiveness, by which parents are impelled to love their offspring, is said to be placed in the back part of the head, in the posterior lobes of the cerebrum, immediately above the cerebellum. Now observe in what manner this discovery was effected. Dr. Gall found a protuberance in this part of the heads of women, and for five years he considered the subject, but could advance no farther. At last he discovered a similar protuberance in the heads of monkeys. The question then arose, what is there in common between women and monkeys? At this point he obtained the assistance of a clergyman, who observed that monkeys are very fond of their offspring, and thus solved the difficulty: the conclusion at which he had arrived being afterwards confirmed by the following circumstance,—A woman in whom this part of the head was unusually prominent being ill of a fever, and (we may suppose) delirious, believed herself to be pregnant with five children.

I shall trouble you by giving another example of the manner in which these researches were conducted by the two founders of the phrenological system. They are both of opinion that the organ of pride is situated in the back part of the head, and hence it is, as Dr. Spurzheim has observed, that "all the motions of pride take place in the direction upwards and backwards." But Dr. Gall further believes that it is the greater development of this organ which leads certain animals to prefer to live in elevated situations. Thus there is a proud rat which lives in hay-lofts, and in the attic story of a house; and another, an humble rat, which is content to live in cellars and gutters. It is under the same influence that certain children and little men display a proud disposition by climbing on the backs of chairs, and that kings and emperors are seated on elevated thrones.

CRITES. I do not undertake to defend such far-fetched illustrations as those to which you have referred, and I am ready to admit that even those which are offered by Mr. George Combe (though his phrenological treatise displays very much more of a philosophical spirit than those of his predecessors) partake too much of the same loose and unscientific character. Being no anatomist, I cannot venture to make any observations on the anatomical statement which has been made by Ergates. Still, setting aside all other considerations, if it be true that there are persons who, from the examination of the shape of a man's head, can form a pretty accurate notion as to his character, however the fact is to be accounted for, there must be something more than what is merely fanciful in phrenology. Facts are not to be rejected merely because the explanation offered of them proves to be erroneous; and I have not only heard of them from others, but have myself known instances of such shrewd observations on character made by phrenologists that I can scarcely believe them to have been purely accidental.

EUBULUS. I do not in the least doubt the accuracy of your statement; and indeed I might refer to a part of my own experience in its favour. But I might also refer to still more numerous instances in which the phrenological examination of the head has proved to be a failure. You may perhaps regard me as being in some degree a prejudiced witness, and I will therefore merely refer you to an account, published some years ago, of the visit of Dr. Gall, the inventor of the science, to Sir Francis Chantrey's studio; when he pronounced the head of Sir Walter Scott (who had not the smallest turn for mathematics) to be that of a great mathematician; that of Troughten, the mathematical instrument maker, to be the head of a poet; and at the same time discovered the indications of a superior intellect in another head, the living proprietor of which had certainly as little claim as any man could possibly have to be thus distinguished.

But even if the errors of phrenology were less numerous than I believe them to be, that would not go far towards convincing me of the value of their art. It is not very difficult for a clever observer of human nature to form a notion of some part of a man's character in the course of a brief conversation with him; and an enthusiast in phrenology may very honestly persuade himself that he has obtained from the examination of his head that knowledge which he has really obtained from other sources. Then observe how comprehensive the faculties and propensities of the phrenological system are supposed to be. A large development of the organ of destructiveness in the head of Hare the murderer, explained how it was that he was led to murder sixteen human beings that he might sell their bodies.* But in the head of another person who never committed a murder it is sufficient to find that it exists in combination with a disposition to satire, or to deface mile-stones; and in the beaver and squirrel, it explains how it is that these animals are impelled to cut and tear in pieces the bark, leaves, and branches of trees, for the innocent purpose of constructing their cabins and nests. So the large size of the organ of acquisitiveness not only leads one person to be a thief and another to hoard, but it also explains the habits of the spendthrift (who does not hoard at all); and it impels storks and swallows to return after their migrations to establish themselves, each succeeding year, in the same locality. Following these examples, I do not see that a phrenologist can have much difficulty in finding a character for every individual suited to the particular configuration of his head.

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* A System of Phrenology, by George Combe, 5th Edition, vol. i. p. 262. &c.

ERGATES. After what I have already said you will scarcely suspect me of being a convert to the doctrines of phrenology. We must not, however, lose sight of the facts, that idiots for the most part have small heads, and that we are generally agreed in considering a large head and a capacious forehead as indicative of superior intellectual endowments. In like manner as the ancient sculptors gave to the figures of some of the Heathen Gods the appearance of youth, by shortening the jaws so that they could not be supposed to contain the entire number of teeth belonging to the adult, so they expressed the Divine intelligence of others by increasing the dimensions of the forehead. But even to this rule there are exceptions. Some very stupid persons, within my own knowledge, have had very large heads. On the other hand, if we may trust to the authority of the bust of Newton in the apartments of the Royal Society, the head of that mighty genius was below the average size; and Moore describes the head of Byron as having been unusually small, with a narrow forehead; the fact being confirmed by an anecdote related by Colonel Napier, of a party of fourteen persons having tried to put on his hat, and having found that it was too small to fit any one of them. On a former occasion I adverted to an hypothesis by which these anomalies may be explained. The nervous force is supposed to be generated in the grey or vesicular substance, of which the greater part is expanded on the surface of the cerebral hemispheres, the extent of that surface depending not so much on the bulk of the entire brain as on the number and depth of the convolutions. Without, however, having recourse to this explanation, it is easy to suppose that a more or less refined organization may make all the difference, so that the smaller brain of one individual may be a more perfect instrument for the mind to use than the larger one of another.

Eubulus. Men's characters are compounded of so many elements, and are influenced by so great a variety of circumstances, that it is difficult to understand how they can be determined by any such simple rules as those laid down by the phrenologists.

First, there are those original and necessary instincts, without which the human race could not exist at all, but which are nevertheless, in like manner as the higher or intellectual faculties, more complete and of greater intensity in some individuals than they are in others. Then there are those habits which are gradually acquired during several successive generations, by which chiefly the different races of mankind are distinguished from each other; which cause one nation to be peaceful and another warlike;

which engender low-mindedness and cunning in those who have had an uncertain tenure of life, or liberty, or property, under an arbitrary and oppressive government; and give rise to liberal sentiments, and an open and manly bearing in those who have had the advantage of belonging to a free and well regulated community. To these we may add those other habits and modes of thinking which are the result of early discipline and training in individual cases; which dispose him who has been brought up among thieves to become a thief; which cause the spoiled child, whatever his original disposition may have been, to grow up into the selfish man; which explain how it is that of two persons with the same amount of natural talent, one remains from the beginning to the end of his life absorbed in frivolous pursuits, and dies unregretted, or perhaps despised; while the other is distinguished for his genius and superior intellectual attainments, transmitting his name to posterity as that of a benefactor of the human race. If we pursue the inquiry further, we find that in addition to moral agencies such as I have enumerated, there are various physical agencies which co-operate with them in forming individual characters. One man is in that state of bodily health, that even in spite of adverse circumstances he is always cheerful and contented, ready to sympathize with others, and obtaining their sympathy in return. Another oppressed by chronic dyspepsia, or visceral disease, or having his nervous energies exhausted by excessive labour, is in that condition which causes every impression made on him to be attended with more or less of an uneasy feeling; and hence he is fretful and peevish, doubtful as to himself, suspicious of others; so that it is only under the influence of a high moral principle, and by a constant effort of self-control, that he can avoid being ungracious in his general behaviour, and in his dealings with mankind, bring himself up to the level of his more fortunate competitor. Nor are physical agencies of another kind less influential in other ways. It cannot be supposed that the young gentleman of fashion, whom I remember to have seen described in one of the police reports as never being without a cigar in his mouth, except when he was at his meals or when he was asleep, had any other than a muddled intellect; and the alcohol circulating in the vessels of the habitual drunkard must have even a more injurious influence than the poison of tobacco. We may carry our inquiries further still, and in doing so we find the problem to become still more complicated. How often does it happen that the character alters as years advance! The young man who enters on his career in the possession of what are called great worldly advantages, full of hope, flattered by those around him, and expecting of life more than life can bestow, incurs a great risk of becoming in the end a disappointed misanthrope. So the spendthrift of one period may be the miser of another; and he whose early efforts obtain for him the reputation of superior intelligence, not unfrequently ends where he began, having allowed his talents to run to waste, and never accomplished anything afterwards by which he might have been distinguished from the herd of ordinary mortals.

ERGATES. You may include in the same category the changes which take place in advanced life, and which are undoubtedly to be attributed to an altered condition of the brain; beginning with the failure of the memory as to recent events, and ending with the fatuity which occasionally is met with in extreme old age.

EUBULUS. There can be no question as to the occurrence of the changes which you mention. At the same time my own observations lead me to believe that the failure of the mind in old age is often more apparent than real. The old man is not stimulated by ambition, as when he felt that he might have many years of his life before him. He has probably withdrawn from his former pursuits, and has substituted no others for them; and we know that the mind as well as the body requires constant exercise to maintain it in a healthy state. Where it is still occupied we frequently find it to survive the decay of the body, retaining its energy and vigour even to the last.

Taking all these things into consideration, it is difficult to understand how any simple rules can be laid down for explaining and determining men's characters. The prime minister whose maxim it was that "every man had his price" was, in his view of the subject, just as wide of the mark as Gall and Spurzheim were in their more comprehensive scheme. He drew his conclusions from a too limited experience, and did not bear in mind that those who had not their price were just the persons with whom it was least likely that he should come in contact. Adam Smith has been to a considerable extent successful in referring to that involuntary sympathy (or instinct) which causes us to participate in what is felt, or what we suppose to be felt, by others, as the foundation of our moral sentiments. But the doctrine of sympathy does not explain the whole; and especially it has no reference to the intellectual faculties, which in all the concerns of life are so mixed up with the moral sentiments, each influencing the other, that to study either of them separately is as useless as it would be to study geology without reference to chemistry and mineralogy, or the phenomena of the living body disregarding the laws which operate on inorganic matter. What I have ventured to call "the science of human nature" is a department of knowledge, in which I will not say that we recognize no leading principles, but in which we recognize none that will supersede the necessity of minute observation, and an extended individual experience. For all practical purposes the study of it must be conducted very much in detail, and no one can make much progress in it whose views are limited to one variety of the human species, or to one class in society; or whose situation is such that he is merely a looker on, and not himself an actor in the busy drama of life.

CRITES. You may add that whoever would understand the minds of others, and exercise an useful influence over them, must first understand himself. He who forms a wrong estimate of his own capabilities, of his own prejudices, and of the weak points of his own character, measures the characters of others by an erroneous standard. Not only is he in constant danger of undertaking that which he is not qualified, and of neglecting that which he is qualified, to perform, but he is at the mercy of others, who although they may very probably be inferior to himself in some of the nobler qualities, obtain a dominion over him by studying his defects, and making them subservient to their private purposes.

EUBULUS. Whatever they may have been otherwise, the priests of the Delphic Oracle were certainly no impostors when they displayed that simple but significant inscription "Γνωθι σεαυτον" over the portico of the temple of the heathen god. If self-knowledge be important as the first step towards a knowledge of the characters of others, on other grounds it is more important still. Though we may admit, with Ergates, that the mental principle must be of the same essence, under whatever form it exists, still there can be no question as to the vast superiority of the mind of man to that of all the created beings by whom he is surrounded. But in what does that superiority consist? Other animals, and more especially the gregarious, are not without an ample share of the moral sentiments. We see them displayed in the dog, who rejoices in being your companion;—who flies to your assistance if you are attacked; in the attachment of the elephant to his keeper who treats him kindly, and in his resentment of injuries; in the roebuck, who pines and dies if separated from his mate; and even in the cat, who, peaceful at other times, turns round on you in anger if you interfere with her kitten. It is not as to these, but as to his intellectual faculties, that there is so vast a difference between man and other animals, that none can be said even to approach him in this respect. But this distinction is not without its price. It imposes on him duties of a higher order, and greater responsibilities. He is required not to yield to the impulse of the moment, but to look to the more remote consequences of what he says and does; and to keep not only his instincts and passions, but even his thoughts, in subjection to his will. Nor can this be rightly accomplished by any one who does not regard his own powers, his own disposition, and his peculiar moral temperament, influenced as it is by his physical condition and his mode of life, as a fit object of study, even more than anything external to himself. This brings us to other inquiries of the highest interest, involving as they do so much of what is of the greatest importance to ourselves and others; inquiries which have not been neglected by heathen philosophers, but which assume a more exalted character, when pursued by those who, guided by the light of revelation, feel that they are answerable to an almighty power for the right use of the faculties with which they are endowed. But on these we have no leisure to enter at present. Whatever may be the value of our discussions, from the arrangements which you, my friends, have made, we must consider them as terminated.

"*Quæ cum essent dicta, finem fecimus et ambulandi et disputandi.*"

ADDITIONAL NOTES.

NOTE A.

THE following eloquent passage, extracted from Dr. Newman's lectures, will be read with interest in connection with the observations of Sir Walter Scott and Sir Humphry Davy, referred to in the text: —

Self-educated persons "are likely to have more thought, more mind, more philosophy, than those earnest but ill-used persons, who are forced to load their minds with a score of subjects against an examination; who have too much on their hands to indulge themselves in thinking or investigation; who devour premiss and conclusion together with indiscriminate greediness; who hold science on faith, and commit demonstrations to memory, and who too often, as might be expected, when their period of education is passed, throw up all they have learned in disgust, having gained nothing by their anxious labours except, perhaps, the habit of application.

" Yet such is the bitter specimen of the fruit of that ambitious system, which has of late years been making way among us. But its result on ordinary minds, and on the common run of students, is less satisfactory still.

They leave their place of education simply dissipated and relaxed by the multiplicity of subjects, which they have never really mastered, and so shallow as not even to know their own shallowness. How much better is it for the active and thoughtful intellect, where such is to be found, to eschew the college and the university altogether, than to submit to a drudgery so ignoble, a mockery so contumelious! How much more profitable for the independent mind, after the mere rudiments of education, to range though a library at random, taking down books as they meet with them, and pursuing the trains of thoughts which his mother wit suggests! How much healthier to wander into the fields, and there with the exiled prince to find 'tongues in the trees, books in the running brooks.' How much more genuine an education is that of the poor boy in the poem, — a poem, whether in conception or execution, one of the most touching in our language, — who, not in the wide world, but ranging day by day round his widowed mother's home, a dexterous gleaner in a narrow field, and with only such slender outfit

> "'As the village school and books a few supplied,'

" contrived, from the beach, and the quay, and the fisher's boat, and the inn's fireside, and the tradesman's shop, and the shepherd's walk, and the smuggler's hut, and the mossy moor, and the screaming gulls, and the restless waves, to fashion for himself a philosophy and poetry of his own."

NOTE B.

THE question referred to in the text has been thus stated by a contemporary writer: —

"The advocate for an immaterial principle is often unjust to his argument, in his assiduity to rid himself of those facts which attest the close and constant action of matter upon mind. They are too palpable, not only in matters of sense, but also as regards the purely mental processes, to admit of any evasion. His true doctrine lies beyond this; in asserting a principle submitted indeed to these influences, but different from them; capable of independent changes and actions within itself; and, above all, capable of self-regulation in those functions of thought and feeling to which external agents minister in the various processes of life. The ministering agents may become disturbing ones, and such they frequently are to a singular extent. But in this we have no proof of identity. Whatever of reason we can apply to an argument insuperable by human reason is against it; and the record of such instances is wholly comprised within that one great relation, which pervades every part of our present being; but the intimate nature of which is a sealed book to human research."—*Medical Notes and Reflections*, by Sir HENRY HOLLAND, Bart. M.D. 2nd edit. p. 461.

NOTE C.

If a comparison of the effects produced by various stimulant and narcotic agents on the nervous system be interesting to the physiologist, it ought to be not less so to the moral philosopher and the statesman.

At one period opium was much in request among the inferior classes of the metropolis, and there were chemists who disposed of many boxes of opium-pills on a Saturday night. Then gin became cheap; the gin-palaces arose, and opium was neglected. This was greatly to the advantage of the revenue. But was it of advantage to society? The effect of opium when taken into the stomach is not to stimulate, but to soothe the nervous system. It may be otherwise in some instances, but these are rare exceptions to the general rule. The opium-taker is in a passive state, satisfied with his own dreamy condition while under the influence of the drug. He is useless, but not mischievous. It is quite otherwise with alcoholic liquors. When Bishop and his partner murdered the Italian boy, in order that they might sell his body, it appeared in evidence that they prepared themselves for the task by a plentiful libation of gin. The same course is pursued by housebreakers, and others who engage in desperate criminal undertakings. It is worthy of notice, also, that opium is much less deleterious to the individual than gin or brandy. Many opium-takers live to a great age, while dram-drinking induces disease of the liver, with its attendant bodily suffering, ill-temper, wretchedness, and premature death.

The effect of malt-liquor, like that of gin, depends on the alcohol which it contains, modified, however, in some degree, by the sedative properties of the hop. But it is much less dangerous. According to Mr. Brande's tables, the proportion of alcohol in gin is as much as 50 per cent., while in London porter it is not much more than 4 per cent. The porter-drinker, therefore, must drink 6¼ pints of porter to obtain gradually the effect which the gin-drinker obtains at once from half a pint (8 ounces) of gin. Gin-drinking, moreover, is in some other respects better suited to the ill-disposed part of the population. It does not distend the stomach as is the case with the more diluted liquor when taken in large quantity; and therefore does not at the time interfere so much with active exertion. It is also more economical. Eight ounces of the strongest gin (at the present prices) costing about one-sixth part less than their equivalent in porter.

NOTE D.

Although Dr. Mayo's "Croomian Lectures on Medical Testimony and Evidence in Cases of Lunacy" have been on one point referred to in the text, they were not published until a considerable time after these papers were ready for the press.

Dr. Mayo has carefully analysed the facts which bear on the question as to what has been called "moral insanity." He has shown that many of the cases described as belonging to this category were neither more nor less than examples of insanity, according to the strict and ordinary interpretation of that term. He has shown that others, in which the plea of "moral insanity" was set up as an excuse for crime deserved no better appellation than that of "brutal recklessness;" and that to acquit criminals of this class on the ground of irresponsibility, is only to induce others to follow in the same course, who might otherwise be restrained by a wholesome fear of punishment.

Even with regard to those who are actually insane, he is of opinion that there is a defect "in the nature of our criminal code, which recognizes no punishment for offences committed by the insane; and forces the Courts either to visit them with the same penal inflictions as would apply to the same acts committed by the sane, their derangements being ignored, or to let them pass unpunished, however partially responsible they may appear."

Dr. Mayo has treated the whole subject, including that of mere unsoundness of mind, in the most able and lucid manner; and his observations on it are the more valuable, and will have the greater weight, as they come from one who combines just theoretical views with the practical knowledge of an experienced physician.

NOTE E.

Even setting aside the cases of dying persons, or of those who labour under serious disease, there is sufficient evidence that in many instances those who appear to be insensible to external impressions are not so in reality; the apparent insensibility being the result of a strong dislike, or disinclination, to make the effort necessary for giving expression to what they feel, and of nothing more.

Esquirol describes the case of a young man who, after some disappointment in life, fell into what seemed to be a state of idiotcy. His eyes were fixed: his physiognomy was without expression. It was necessary to dress and undress him; and to put him in bed. He never ate, except when food was put into his mouth. He never walked, except when compelled to do so. He recovered after the use of some remedies, and the appearance of an eruption on his skin. After his recovery he confessed that he had never been insensible at all, but that an internal voice was always repeating to him "*Ne bouge pas! ne bouge pas!*" and that fear alone had rendered him immovable.*

In other instances the apparent insensibility is the result of mere imposture.

A young woman (a hospital patient) under the care of Esquirol, seemed to be in a state of profound stupor. She lay motionless in her bed, never speaking, even when pinched or pricked with a sharp instrument. A seton was made in her neck, and blisters were applied in various parts of her body, but she gave no signs of feeling, or even of knowing what was done. One day, however, when Esquirol paid her his usual visit, she had left her bed of her own accord, and from that time nothing could persuade her to remain in the dormitory at the time when he was expected.

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* Esquirol, op. cit. vol. ii. p. 287.

When she left the hospital she confessed that her insensibility had been feigned. She said that one of the students had made the experiment of pinching her; that she had felt no objection to this being done by Esquirol himself, but that she did not choose to submit to what she conceived to be a piece of impertinence on the part of the student, and therefore had determined to be always out of the way when the medical attendants were to visit her.*

A case recorded in the Philosophical Transactions, very forcibly illustrates the extent to which such an imposture may be carried.

A young man, the son of a farmer in the neighbourhood of Bath, fell into what was supposed to be a state of profound sleep, which lasted during seventeen weeks. During this time he was visited by a great number of persons, and various attempts were made to awaken him, but without success. He was cupped;

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* Esquirol, op. cit. vol. ii.

spirit of ammonia was held to his nostrils, and even poured into them so as to occasion inflammation and blisters, but all in vain. He slept on as before, and hence Dr. Oliver, who relates the case, was satisfied that "he was really asleep, and no sullen counterfeit as some persons thought him."

The correctness of Dr. Oliver's opinion may, however, well be questioned: as every night his mother placed on a stool by his bedside some bread and cheese and beer, which always had disappeared in the morning; and as certain functions, the necessary consequence of eating and drinking, were regularly and decently performed.*

Impostures of this kind will appear in no degree extraordinary to those who are accustomed to witness surgical operations, not performed under the influence of anæsthetic agents, and who know how common it is for patients to undergo even those of the most painful kind without uttering a complaint, or in any way expressing what they feel.

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* Philosophical Transactions, 1706, vol. xxiv.

NOTE F.

There probably is in the whole range of science no problem the solution of which is more difficult than that of the relation of the mental faculties to particular parts of the nervous system. Some very general propositions may be considered as established on not very insufficient data, and it is not impossible that by the method pointed out in page 170,—namely, a careful study of the habits and faculties of inferior animals, pursued simultaneously with the examination of the difference of the structure of the brain,—some further insight may ultimately be obtained into this mysterious subject. It is not easy to understand in what other way this object can be attained. The inquiry, however, is one which may well excite our curiosity, and it is no matter of wonder that it should have attracted the attention of physiologists. Those who wish to be more particularly acquainted with the views entertained by the most eminent modern physiologists may refer to Dr. Carpenter's "Principles of Human Physiology." Allusion has been made in a former part of this volume to the crude speculations of Dr. Hooke. The subject has been treated of in a more elaborate manner by a contemporary of Hooke, being the most distinguished anatomist and physiologist of the 17th century; and the following abridged account of the conclusions at which he had arrived is offered to the reader, as it may be interesting to compare them with the opinions which are held at the present day. It is plain that the majority of these conclusions do not rest on any very sure foundation; but *"valeant quantum valent."*

According to Willis *, the nervous force (termed by him the animal spirits) is generated wholly in the grey or vesicular substance of the brain, which, being a kind of secreting organ, is, therefore, possessed of a higher degree of vascularity than the medullary. The convolutions of the cerebrum and the folds of the cerebellum are intended to offer a more extended surface for the grey substance, and thus to enable it to furnish a more abundant supply of the nervous force than could have been furnished otherwise. The medullary substance (in which Willis had detected the existence of a fibrous structure, having traced the fibres from the *medulla oblongata* thorough the *corpora striata* and *thalami*), is intended for the transmission, exercise, and dispensing of the nervous force, but not for its production.

By means of the medullary substance, connected as it is with the grey substance of the convolutions, the nervous force is transmitted to the *corpus callosum*, and this last-mentioned organ is that which is principally connected with the intellectual faculties; at the same time that, by combining the two hemispheres of the cerebrum, it enables them to co-operate with each other. The forms of sensible objects are preserved in the convolutions, "*tanquam in diversis cellulis et apothecis;*" from which we must conclude that Willis regarded these as especially connected with the memory. The *corpora striata* are the channel of communication between the *medulla oblongata,* the nerves, and the cerebral hemispheres. They are themselves the seat of simple sensation. But the impressions of the senses being transmitted from thence to the *corpus callosum,* and from the latter to the convolutions, become there subservient to the memory and imagination, and excite in the mind the feeling of desire, and acts of volition. The same impressions, in some instances, instead of being transmitted to the cerebrum, are, by a reflex operation, propagated in the other direction,—that is to the nerves, producing in them effects of which the mind takes no cognizance, and motions of which we are therefore unconscious.

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* See his treatises *De Anatome Cerebri* and *De Animâ Bruterum;* the latter, however, is chiefly occupied with metaphysical speculations, many of which relate to matters which may well be regarded as beyond the limits of human knowledge.

The cerebellum belongs more especially to what Bichat has called "organic life," and furnishes the nervous force required for the action of the heart, respiration, digestion, and the other mere corporeal functions. It is also the part principally connected with the animal instincts (*instinctus mere naturales*), and the emotions; but not exclusively so, as the other bodies, situated in the base of the brain, belong to the instincts and emotions also.

With regard to the former, Willis supposes the cerebellum to be associated with the cerebrum, inasmuch as the desires belonging to the instincts can produce no effect until their influence is communicated to it, exciting in the mind, through its intervention, the act of volition. As regards the emotions also, the cerebellum is associated with the cerebrum, but in this case, the movement is in the opposite direction, beginning in the cerebrum, and from thence extending to the cerebellum, so as to affect the heart, and other organs which are under its immediate control.

NOTE G.

The following case may be adduced in confirmation of the evidence which anatomy affords as to the grey matter of the nervous system being the part in which the nervous force is generated:—A young woman, of hysterical constitution, died after having been for some days in a state of great mental excitement, attended with convulsive movements of the limbs, resembling those of aggravated chorea, consequent on her having been terrified by a man who had insulted her in a most outrageous manner. On examination of the parts after death, the determination of blood to the grey matter on the surface of the convolutions was found to have been such as to make it everywhere of a scarlet colour.

The circumstance of the convolutions of the cerebrum being more numerous and complicated, thus presenting a larger surface for the expansion of the grey matter, in man than in any other animal, seems to justify the opinion enunciated by Des Moulins, and adopted by Dr. Carpenter, Dr. Todd, Mr. Bowman, and other eminent physiologists, that this peculiar structure is connected with the greater extent of the intellectual faculties in the human race. The observations of Leuret, however, founded on a comparison of the brain in a large number of animals, tends to create some doubt as to the accuracy of this conclusion.* For example, the convolutions of the brain in the sheep are numerous and well marked, while in that of the beaver and of the rat there are almost none at all. But who can doubt that the intelligence of the two last-mentioned animals is much greater than that of the former? Frederic Cuvier, indeed, finding that the beaver, living without companions, in the *Jardin des Plantes*, when supplied with wood, began to build a hut in the same way as when living in association, was led to believe that he was of a very low degree of intelligence, and almost wholly under the dominion of instinct.† But, on the other hand, it is affirmed by Buffon that a solitary beaver, in a well-inhabited country, does not build a hut at all, but seeks for his residence some natural excavation on the bank of a river ‡; and Cartwright, describing the habits of beavers, as observed by him in Labrador, adduces various instances of their adapting their proceedings to the new and peculiar circumstances in which they are placed, in a way which can be attributed only to intelligence.

Monsieur Dareste suggests that the extent of the convolutions bears a relation, not to the intelligence, but to the size of the animal §, a view of the subject corresponding to that taken by Haller *, and supported by many facts. But here also there are exceptions sufficient to prevent the adoption of the general rule. For instance, the kangaroo is a much larger animal than an average dog, but the convolutions of the brain in the former of these animals are very much less extensive than they are in the latter.

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* Anatomie comparée du Système Nerveux, chap. 6me.

† Annales d'Histoire Naturelle, tome ix. pp. 291—318.

‡ Ibid. tome i. p. 266.

§ Comptes rendus, Janvier, 1852, Annales d'Histoire Naturelle, 3me série, tome xviii.

* Elementa Physiologiæ, lib. 1. n. 7.

NOTE H.

If any one of the phrenological doctrines has been supposed to be better established than another, it is that of the cerebellum being the seat of the sexual passion. The following extract from Leuret's work on the Nervous System will show what it is really worth: —

"Le développement comparatif de l'encéphale des chevaux soumis à la castration, et de ceux que l'on a laissés entiers devait, s'il était bien déterminé, servir à la solution des questions que je m'étais posées, et me fournir un document propre à confirmer, ou à détruire, la théorie de Gall concernant l'influence que la castration exerce sur le cervelet. M. Gérard Marchant a bien voulu faire pour moi cette épreuve, en pesant comparativement le cerveau, le cervelet, et la moëlle allongée, d'un certain nombre de chevaux entiers, de jumens, et de chevaux hongres, qui servent aux opérations de l'école d'Alfort. Les pesées faites par M. Marchant, avec le concours de M. Lassaigne, offrent toute la garantie d'exactitude que l'on peut désirer, et je les regarde comme infiniment preférables à la simple inspection du crâne dont Gall se contentait toujours, ou même à la mensuration de la cavité crânienne du cervelet, quelque exacte qu'on puisse la faire.

"Le tableau suivant contient le poids absolu, et le poids relatif, du cerveau, du cervelet, et de la moëlle allongée de quarante-trois chevaux entiers, douze jumens, et vingt-un chevaux hongres."

Here follow the tables, which it is unnecessary to give in detail, but of which the following is the result:—

"La comparaison du poids relatif du cerveau et du cervelet donne ce rapport d'une manière exacte ; et ces rapports sont les suivants :

"Chez les chevaux hongres
le cervelet est au cerveau comme 1 est à 5·97
Chez les jumens - - comme 1 est à 6·59
Chez les étalons - - comme 1 est à 7·07

"Ainsi ce sont les étalons qui ont comparativement le cervelet le moins developpé ; les jumens sont mieux favorisées qu'eux sous ce rapport ; et les chevaux hongres le sont plus que les uns et les autres. Si l'un des deux parties principales de l'encéphale s'est atrophiée c'est le cerveau, car il est seulement de 419 grammes, tandis que le cerveau des étalons est de 433 : et si l'une d'elles s'est développée de manière a prédominer sur les autres, c'est le cervelet des chevaux hongres, qui pese 70 grammes, tandis que celui des étalons et des jumens n'ont pesé que 61." *

Whoever is desirous of inquiring further into the system of Gall and Spurzheim, will do well to consult the "Examen de la Phrénologie," by M. Flourens,

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* Anatomie comparée du Système Nerveux, tome i.

and the "Treatise on Phrenology," in the seventh edition of the Encyclopædia Britannica, by Dr. Roget. In the former the subject is discussed on general grounds; in the latter it is still more fully considered in its details; and in both it is treated of in a manner worthy of the high reputation of the respective authors.

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